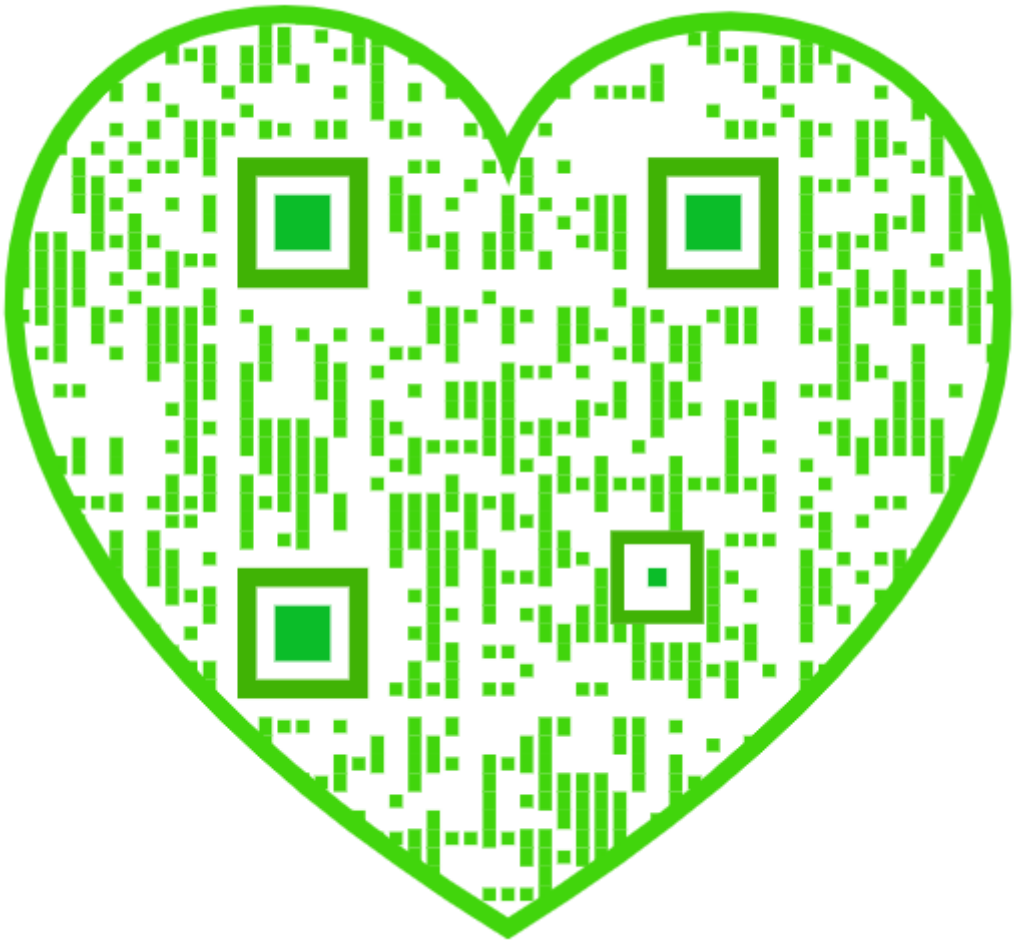

THE

PRINCIPLES AND PRACTICE

OF

BANDAGING

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BY

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Illustrated from Original Drawings by the Author

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TO

THE MEMORY OF MY TEACHERS

PROF. D. HAYES AGNEW, M.D., LL.D.

AS A TRIBUTE TO HIS ABILITY AS A SURGEON AND OF THE
LOVING ESTEEM IN WHICH HE WAS HELD
BY THE MEMBERS OF HIS
PROFESSION

AND

PROF. JOHN ASHHURST, JR., A.M., M.D.

WHOSE WIDE KNOWLEDGE OF THE LITERATURE OF HIS PROFESSION
AND WHOSE EXACT ATTENTION TO THE MINUTEST
DETAILS OF HIS CASES ALWAYS COMMANDED
MY SINCERE ADMIRATION AND EVER
STIMULATED ME TO EMULATE

THIS LITTLE VOLUME IS DEDICATED

51102

PREFACE.

The present volume is based on a previous one by the same author, issued in 1891. The illustrations, however, have all been redrawn and the manuscript rewritten, so that it is practically a new book. In describing the roller bandages an endeavor has been made to give their simplest and best mechanical construction. As a rule only the essential turns have been described and illustrated; to have done more would be simply to confuse the learner. Of recent years the prevalence of gauze bandages and their substitution for those of muslin have caused a great deterioration in their application. Many surgeons seem to wind them aimlessly around a part without the faintest idea of order or sequence.

It is hardly necessary to say that there is a right way and a wrong way to apply even a gauze bandage, and the right way is the best way. No attempt has been made to describe all peculiar bandages or turns. Every surgeon will modify the bandage according to the emergencies of the case, but the bandages and turns embodying principles have been both described and illustrated in detail. Simplicity is the main characteristic of the modern bandage. The old writers, particularly Galen, describe most intricate bandages winding in many unusual directions. Almost every newly in-

vented turn can be found in the bandages of the ancients. Their bandages were too complex, while we on the other hand are apt to be ignorant of their proper construction and careless in their application.

Inasmuch as the book is intended for beginners and others not informed in medicine, the language used has been as simple and direct as possible, technical terms and expressions being avoided.

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A TREATISE ON BANDAGING.

PART I.

THE ROLLER BANDAGES.

THEIR PREPARATION AND APPLICATION.

The *roller bandage* is a strip of muslin or other fabric,

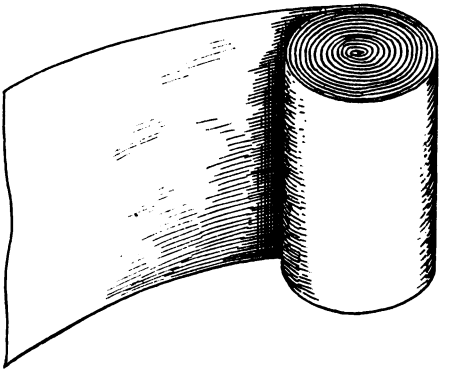

FIG. 1.—ROLLER BANDAGE.

varying in length and width, wound on itself, forming a compact roll (Fig. 1).

The Double Roller.—When each extremity is wound to-

ward the middle, forming two cylinders, it is called a double roller or double-headed bandage (Fig. 2).

A *roller bandage* is spoken of as having an upper and a lower edge, an inner and an outer surface, a body and two extremities, one being the initial extremity or beginning, and the other the terminal extremity or end.

The **Material** of which bandages are made depends on the uses for which they are intended. It may be of muslin, flannel, gauze, or cheese-cloth, crinoline and plaster, or rubber.

Rubber.—If it is desired to render a limb bloodless by Esmarch's method, a rubber bandage is used. It is also employed in the treatment of leg ulcers, swellings, affections of the joints, etc.

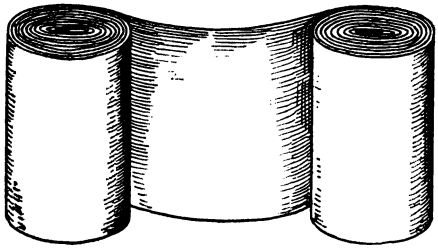

FIG. 2.—DOUBLE ROLLER BANDAGE.

Gauze or Cheese-cloth.—Bandages made of gauze such as is used for surgical dressings have almost wholly displaced those made of muslin. In applying them reverses should seldom be employed. They adapt themselves more neatly to the part and are less liable to displacement than the muslin bandages.

Plaster bandages are those made of crinoline or gauze, into the meshes of which plaster-of-Paris has been rubbed.

Flannel.—Flannel bandages are used in certain important operations where expense is a secondary consideration and it is desirable to have a more elastic bandage than one made of muslin. They adapt themselves more readily to uneven surfaces, make a more equable compression, and are less liable to displacement. The greatest objection to them is their expense. They are most often used in bandaging

the eyes and in covering a part previous to the application of a plaster dressing.

Muslin.—Bandages made of unbleached muslin are still considerably used, especially for dressing fractures, retaining applications to a part, etc.

PREPARATION OF BANDAGES.

In order to prepare a lot of bandages, a piece of unbleached muslin of medium quality, corresponding to the length of the bandage desired, is taken and, after the selvedge has been torn off, one extremity is divided into as many ends as it is desired to have bandages. If the stuff is one yard wide and it is desired to make it up into two-inch bandages the end is nicked with a pair of scissors at every two inches, dividing it into eighteen parts. Each two-inch strip is then torn down for about two feet. We now have one end of the piece torn into eighteen two-inch strips, each about two feet long. The alternate strips are then separated, half on one side and half on the other. Those on one side are gathered together and held firmly by one person, and those on the other by an assistant. Each now pulls strongly until the piece of muslin is torn completely through its entire length, making eighteen strips, each the entire length of the piece and two inches wide. A few of the ravelings are now picked off, to prevent tangling, and the strips laid lengthwise and straightened out. They are now ready for rolling.

A whole piece of muslin may be divided into strips at one time by means of a machine such as is used by clothing manufacturers.

Rolling of Bandages.

By Machine.—To roll these strips into cylinders, if many are to be prepared, a machine called a bandage roller is

used (Fig. 3). It consists of a small winch held in place by two uprights and fastened to a table. The axis is not round, but square or hexagonal, and tapering, being thicker at the end near the handle. Two or more round pegs bind the sides together and serve to flatten out the bandage as it is wound on the axis. After being moistened with water from a sponge the end of one of the strips is passed between or around the pegs and wound around the thin end of the axis. It is then pushed toward the thick end until it is perfectly tight. The bandage is now guided by the left hand while the handle is turned with the right. The handle should be kept firmly pressed against the upright and not allowed to slide in and out, as that will make the bandage uneven. Some think they can wind the bandage more evenly if one edge is kept close up to the side of the machine.

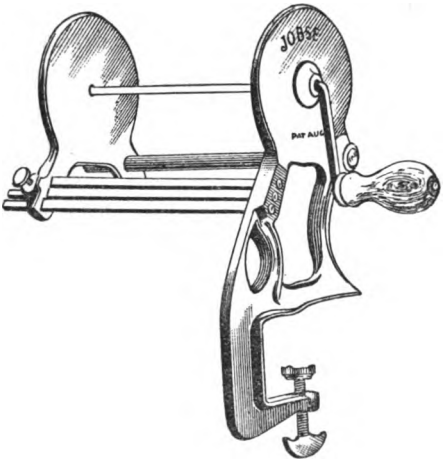

FIG. 3.

When the bandage is nearly all wound, the roll is grasped with one hand and held while two or three additional turns are given; this makes it more firm and solid. To loosen the roller, grasp it firmly with one hand and reverse the crank two or three times and draw it out completely.

The ravelings having been pulled off, the end of the bandage is to be turned under and pinned.

If it is desired to place the pin lengthwise in the roller, then the whole end should be folded under; but if crosswise, then each corner should be turned under and the pin put

in the apex so formed, care being taken that the point of the pin does not project.

Another way to fasten the end is to put a small strip of adhesive plaster about an inch long on it; still another is to moisten the end for two or three inches with water and then finish winding it. There is enough sizing in unbleached muslin to make the end adhere without pinning.

When large numbers of bandages are to be rolled, as in hospitals, it is well to allow some of the patients to roll

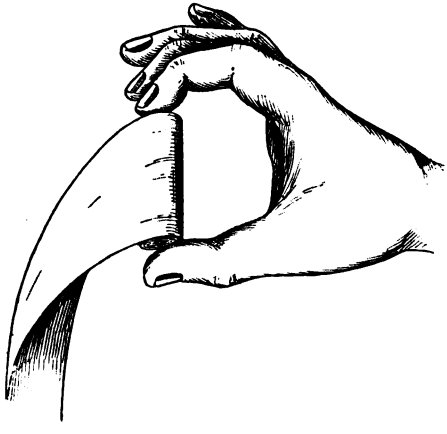

FIG. 4.—ROLLING BY HAND.

FIG. 5.—GRASPING THE ROLL.

them up loosely and then have them re-rolled by an experienced hand.

Bandages intended for ambulance or other outside use should be secured with a pin, to be used in fastening it after its application.

By Hand.—A properly prepared bandage should be even on the edges and tightly rolled. It is difficult to apply satisfactorily a loosely rolled bandage. With a machine they can be rolled better and more quickly than by hand, yet it behooves all who use bandages to be able to roll them

skilfully without it, as it will often be necessary for them to do so. To roll a bandage by hand proceed as follows: Two feet of the end of the bandage is folded repeatedly on itself until a firm, compact mass is made. This is rolled first with the fingers and then on the thigh, the loose bandage being kept taut by the other hand, until a roll is formed sufficiently large to roll with both hands and not to bend when held between the finger and thumb, as seen in figure 4.

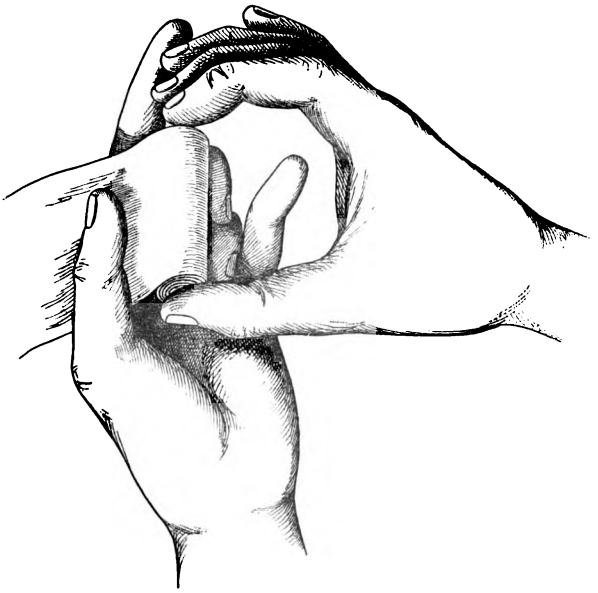

FIG. 6.—ROLLING BY HAND. WINDING THE ROLL.

Grasp the roll between the thumb and index or first two fingers of the right hand, the body of the roller being underneath (Fig. 4). Then place it in the left hand, the lower edge of the loose bandage touching the web of the thumb and index finger (Fig. 5). The roll is now held by the thumb and finger of the right hand while the remaining part of the bandage lies between the thumb and extended index and middle fingers of the left (Fig. 6). The bandage is rolled by

pronating and supinating both hands at the same time, the hold on the roll by the right hand being released during each movement of pronation. The bandage is guided and made tense by pressure of the thumb and forefinger of the left hand as it passes between them. Considerable practice is required to roll bandages well.

Preparing Plaster Bandages.

The gauze used in making plaster bandages is sometimes stiffened with sizing and is called crinoline or mosquito netting. It should have a mesh a little larger than that used for antiseptic dressings, but care should be taken that

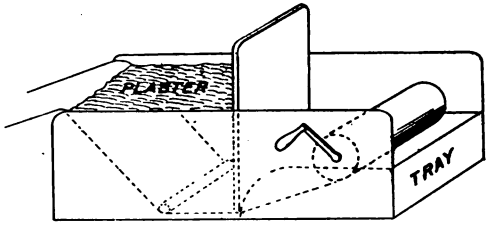

Fig. 7.

it is not too large or the plaster will fall out. It is better to cut the gauze into strips of the required size, instead of tearing, as is done with muslin. Three yards will be found to be long enough. It is the length advised by Sayre. I prefer them two and a half to three inches broad. If only a small number are required they can readily be prepared by one person spreading the plaster on the bandage with a spatula and rubbing it in while another rolls it up loosely. When large numbers are required, they may be prepared with a machine (Fig. 7). If dextrin has been used for sizing, the setting of the plaster may be delayed or prevented.

A trough is made composed of a bottom and two sides.

It should be about fourteen inches long, four inches high, and six inches wide. At one end an incline is inserted beginning on the bottom, four inches from the end, and going up to the corner. At the bottom of this incline a round peg goes across from side to side about a half-inch distant from the incline and the bottom of the box. Near the middle of the box an upright board is placed in grooves.

A winch is put in the remaining end of the box and a zinc tray placed beneath to catch any falling plaster.

The bandage is to be drawn over the edge of the incline, pushed beneath the round peg with a spatula, then beneath the upright board, and fastened to the winch. The box, from the upright board to the incline, is then filled to the top with plaster-of-Paris in powder and the bandage wound around the winch. The surplus plaster is scraped off by the upright board and all plaster that falls off the bandage as it is wound on the winch is received in the tray beneath, to be returned to the other end of the box.

In using this machine the plaster should possess no hard particles, otherwise they will catch on the upright board and disturb the bandage. It is preferable to pass the bandage through and fasten it on the winch while the box is empty, the plaster being put in afterward. When a bandage is nearly done, its end may be pinned to the upper (not under) surface of a new bandage and drawn through. The two ends are then unpinned and the completed bandage removed from the winch. From time to time the tray beneath the winch may be removed and any plaster it contains dumped into the other end of the box.

In using plaster bandages they should be placed on end in a cup of warm water to which, if it is desired to have the plaster set quickly, salt has been added. The water should cover the bandage completely, and it should be allowed to remain immersed until the air bubbles cease coming to the surface. On removal, the bandage should be squeezed very gently to remove the surplus water. Dry

plaster may be dusted on from time to time, as desired, from a tin box with a perforated lid, and smoothed with the moistened hand. A solution of gelatin added to the plaster delays its setting.

APPLICATION OF THE ROLLER BANDAGE.

In applying a bandage perfection should be aimed at. Slipshod, carelessly applied bandages should not be tolerated, albeit they are common enough. It should never be forgotten that a well-applied bandage is one that accomplishes the object with the expenditure of the least amount of material and that has the least liability to displacement. Useless turns should be avoided. They only consume additional bandage, heat the part more, and will not atone for the faulty application of the previous part of the bandage.

A bandage should be applied firmly and evenly, but not tightly, nor yet too loosely. If too tight it will cause pain, inflammation, and sloughing; if too loose it will soon become displaced.

Security.—Security is obtained by a careful application in the first place and not by promiscuous turns, wandering in all directions, laid on after the bandage proper is completed. If still greater security is desired than can be obtained by proper application and pinning, it can be had by the use of strips of adhesive plaster laid on across the turns, or by tacking the turns together with needle and thread. Bandaging, although more of an art than a science, is nevertheless governed by certain fundamental principles, the ignoring of which is followed by bad results. A certain amount of skill and dexterity is also requisite. Therefore practice is necessary, and proficiency is only acquired after repeated trials.

It is not necessary to devise special turns for every case that presents itself. The standard bandages, which have stood the test of time, were devised for just such cases as will be met with in actual practice, and a departure from them will almost always be a step in the wrong direction.

Gaping.—A bandage is said to lie flat when its under surface is in contact with the part to which it is applied.

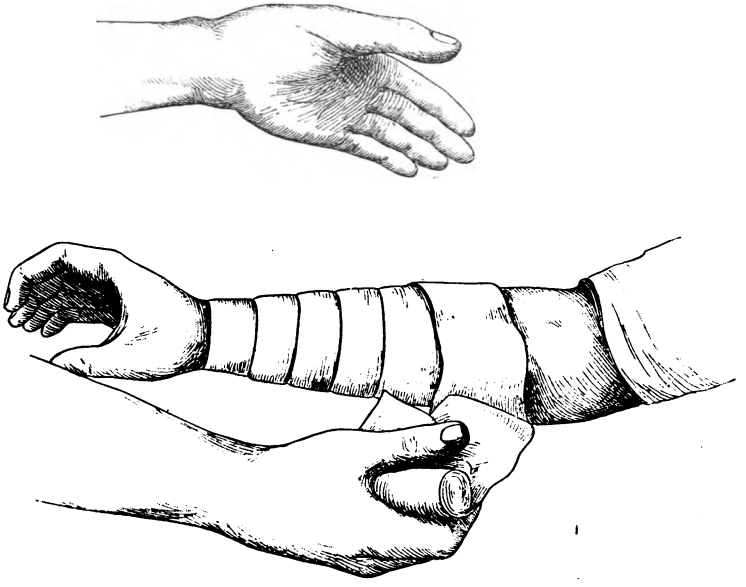

FIG. 8.—REMOVING A BANDAGE.

When, however, the direction of the bandage is such that only one of its edges comes in contact with the part, allowing a space to exist between the other edge and the surface beneath, then the bandage is said to gape, and forms what is known in French as the *godet*.

When a bandage is completed, it should show little or no gaping of the turns, otherwise it is apt to be both inefficient and insecure. If the bandage were inelastic and the parts

immobile, then gapes would be frequent; but the elasticity of the bandage and mobility of the parts aid much in avoiding them.

Dropping a Bandage.—To drop a bandage while applying it is an unpardonable sin. If, however, the body of the bandage falls while the initial extremity is held by the opposite hand, it also should be released at once, so that the entire bandage drops together. By so doing the roll is not so liable to unwind itself as it otherwise would be.

Removing a Bandage.—In removing a bandage from a part, the turns, as they are unwound, should be gathered

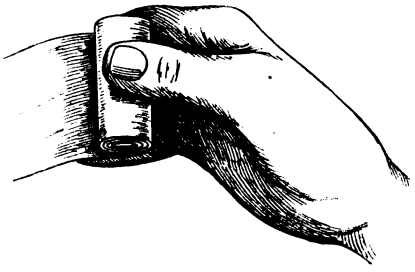

FIG. 9.—APPLYING A BANDAGE—METHOD OF HOLDING.

together and passed *en masse* from one hand to the other. (See Fig. 8.)

Pinning.—In pinning a bandage the pins should have the points down and well concealed in the folds of the bandage; if they are put in longitudinally the heads should be toward the terminal extremity of the bandage.

A pin should not be so placed that a prominence of the part beneath will make its point project. If this is liable to occur, shorten the bandage by doubling its end under and then pin it.

Commencing a Bandage.—In commencing a bandage the roller should be unwound for a few inches and grasped in the hand, the thumb being up and the fingers underneath,

the loose portion of the bandage coming off from its under surface as shown in figure 9.

The external surface of the initial extremity should then be placed on the part where it is proposed to commence and from one to two complete turns made, and then the bandage proceeded with.

The tendency of a bandage to become loose by sliding from the thicker to the thinner end of the part makes it necessary to begin it at the point of least diameter. Thus, the

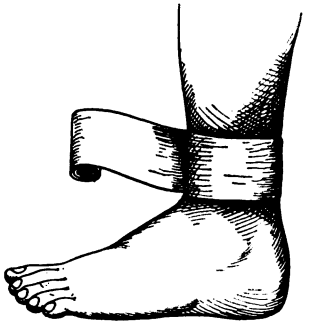

FIG. 10.—FIXING BY A CIRCULAR TURN.

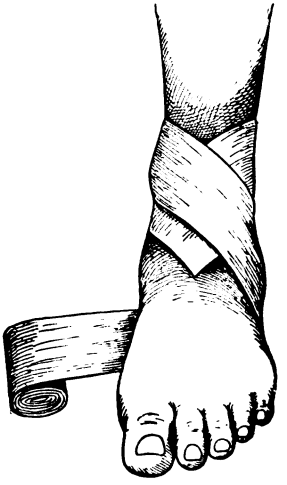

FIG. 11.—FIXING BY AN OBLIQUE TURN.

wrist and ankle are the proper places to commence bandages of the extremities, and when a bandage is to involve both an extremity and the trunk, it is usually considered preferable to begin it on the extremity.

If a simple circular bandage is to be placed on a cylindric part, the initial extremity should be placed at right angles to its long axis, the turns going transversely around it (Fig. 10). If, however, it is desired to simply fix a bandage and then proceed to bandage either above or below

the point of fixation, as in covering the extremities, then the initial extremity should be placed where the parts are conic instead of cylindric, and it should be laid on obliquely.

Thus, in commencing a bandage of the foot, by fixing it around the ankle, the bandage should be placed obliquely in front of the joint (Fig. 11). Here the swelling of the ankle makes a short cone with the base down, and by putting the initial extremity obliquely on the part, at the completion of the turn it can be continued downward without the formation of any gapes. If greater security is desired, two turns instead of one may be made around the part.

Ending a Bandage.—When the bandage proper has been completed, it may either be fastened and the surplus cut off, or else a few additional turns made until it is exhausted. If the terminal extremity comes over the injured part, the bandage should be shortened by turning its end under, thus removing it to a less sensitive place. It is also better not to end it on a bony prominence, as that will tend to make the point of the pin project. When it is not desired to pin the terminal extremity, it may be fastened by splitting it and tying the two ends around the part. This is often done with the finger bandages.

THE FUNDAMENTAL BANDAGES.

In analyzing the various special bandages as they are employed in surgery, we find that they are composed of a number of simple or elementary turns, which we may call the fundamental bandages. Each part of every special bandage is composed of one or more of these elementary turns or bandages, multiplied or arranged according to the part to which they are to be applied and the indications they are intended to fulfil.

These fundamental bandages, together with the methods of their construction and application, constitute the foundation on which all general bandaging is based.

A thorough knowledge of these principles should be acquired before taking up any of the special bandages. A surgeon may be pardoned for not remembering the peculiar turns of some of the many special bandages, but not for showing his ignorance of the great principles on which good surgery depends.

The fundamental bandages may be classified according to their construction, as follows: the circular, the spiral, spiral reversed, figure eight, recurrent, twisted, and knotted.

The Circular Bandage.

The circular bandage is applicable to cylindric parts. While there are few parts of the body that are perfect cylinders, still, owing to the elasticity of the bandage and the softness of the structures, where the departure is not marked, they may be considered and treated as cylinders; thus, an uneven or slightly conical part may be bandaged as though it were cylindric.

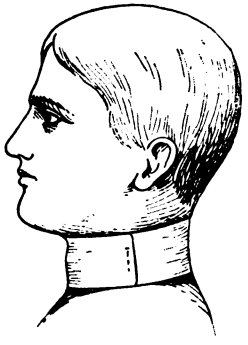

Fig. 12.—Circular Bandage.

The circular bandage consists of two or three turns transversely around a part, the initial extremity being placed at right angles to its long axis, and each turn covering exactly the preceding one. It is shown in figure 12. It is applicable to almost every portion of the extremities and trunk. When a circular turn has been placed around one side of the neck and opposite armpit, it has been called by some authors an oblique bandage; but it is obvious that it does not differ in principle from

a circular bandage of the neck or any other portion of the body.

THE SPIRAL BANDAGE.

A spiral bandage is one which covers a part by turns which encircle it in a spiral manner, like a corkscrew. The spiral bandage may be either a *slow spiral* or a *rapid spiral.* It may be *ascending* or *descending,* and is also applicable to spherical parts.

The Slow Ascending Spiral.—A slow spiral is applicable to a cylindric part or to a cone the size of which increases but

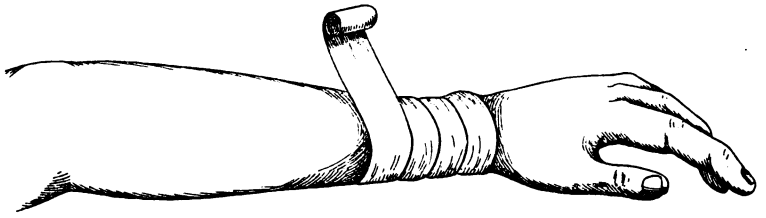

FIG. 13.—SLOW ASCENDING SPIRAL BANDAGE.

slowly. It is applied as follows: Beginning with a circular turn, the bandage is inclined slightly upward and wound spirally around the part, each turn overlapping the preceding one one-half to two-thirds of its width. If so desired it may be finished by a circular turn. The three turns covering the wrist, in figure 13, are slow ascending spiral turns.

Descending Slow Spiral.—Sometimes it is desirable to cover a part from above downward by slow spiral turns. When this is done it forms the descending slow spiral. If the part is cylindric the turns will lie flat on its surface and an overlapping of half the width of the bandage will be sufficient; but if it is slightly conical, the upper part of the bandage will touch while the lower part will gape. The amount

of gaping will depend on the rapidity of decrease in the size of the part. (See Fig. 14.) On account of this gaping the overlapping should be about two-thirds of the width of the bandage. When the bandage, thus applied, is finished, it presents a smooth appearance and shows no gaping.

The descending slow spiral is employed in the spiral bandage of the chest; in going from the point of greatest diameter of the calf of the leg to the knee; in bandaging some

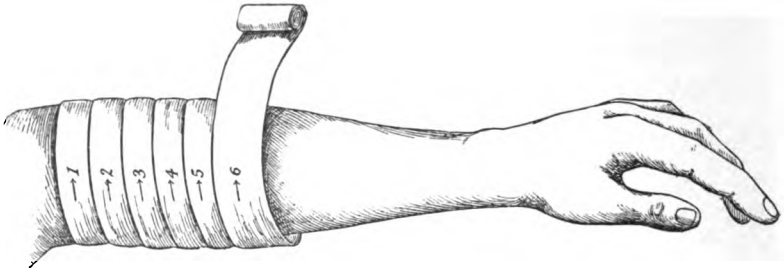

FIG. 14.—DESCENDING SLOW SPIRAL.

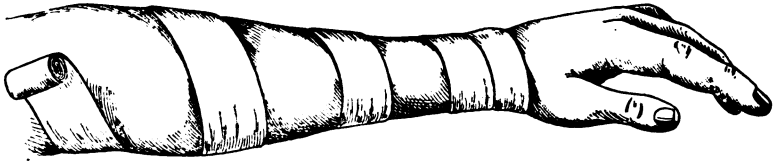

FIG. 15.—RAPID SPIRAL.

portions of the upper extremity, and in the application of splints.

The Rapid Spiral.—A rapid spiral or *oblique* bandage is one which ascends a part in rapid spiral turns, leaving an interspace between them. It is employed to confine, loosely, dressings to the extremities, as in cases of burns, or as a bandage for temporary use. (See Fig. 15.)

The Spiral Principle as Applied to Spherical Parts.—The spiral principle can also be employed in bandaging spherical

parts, such as the skull. Here it should always be borne in mind that the most secure turn is a diameter of the part. Therefore, whenever it is possible, parallel turns should be avoided. The farther away they get from the diameter, the more insecure they become. The turns, being all diameters (more correctly, great circles) of the sphere, radiate from a common center corresponding to its axis, and therefore make a double fan-like arrangement. This is shown in figure 16. The first turn, 1–1, goes directly around the sphere. The second turn, 2–2, goes higher up on the right and lower down on the left. Each succeeding turn overlaps the preceding one-half its width. The bandage can be continued in the same manner until the whole sphere is covered. It will be seen that these turns are analogous to those of the slow spiral, except that, being applied to a spherical instead of a cylindric part, they progress around instead of ascending it.

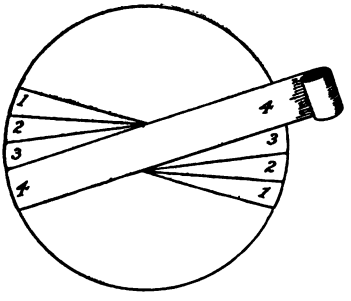

FIG. 16.—SPHERE BANDAGED BY SPIRAL TURNS.

This principle is applicable to bandages of the head, but is also useful in bandages to retain surgical dressings after operations, etc.

THE SPIRAL REVERSED BANDAGE.

In order to completely cover a part which has the shape of a rapidly increasing cone and still have the bandage lie flat, it is necessary to change the direction of the spiral turns frequently by what is known as a reverse. Hence the bandage is known as the spiral reversed. A reverse is necessary whenever it is desired to change abruptly the course of a

bandage. This occurs in bandaging a conical part when the size increases so rapidly as to cause the turns of the spiral to become separated.

The reverse is made as follows: Fix the initial extremity and carry the bandage obliquely upward across the limb. The body of the bandage being held by the thumb and fingers of the right hand, and having not more than five inches of it unrolled, it is so inclined upward as to cause its outer surface to lie flat on the part beneath; traction being made,

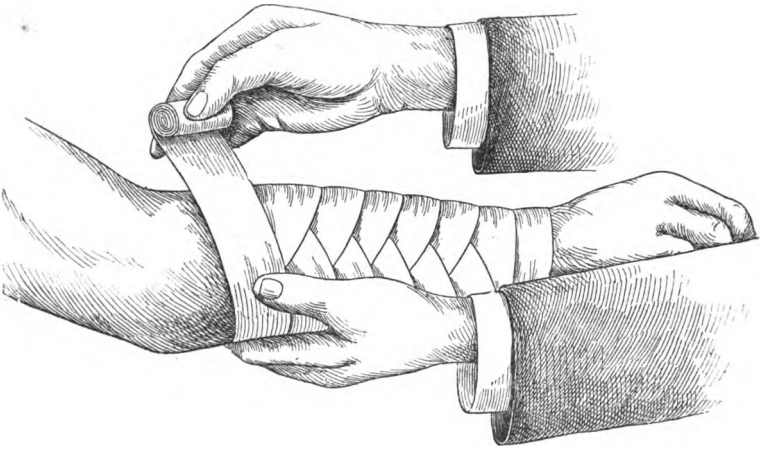

FIG. 17.—THE SPIRAL REVERSE. PREPARING TO REVERSE.

the thumb of the left hand (the fingers being on the under side of the limb) is pressed on the bandage to prevent its loosening on making the reverse. This position is shown in figure 17.

The roller is then approached to the limb, thus loosening the bandage, and the right hand pronated, the bandage being turned over or reversed, and carried at first directly down the limb, and then obliquely to the right until its lower edge is parallel to the lower edge of the preceding turn. (See Fig. 18.) The reverse is to be settled by a couple of gentle

pulls and the body of the roller passed around the limb and grasped by the fingers of the left hand. The thumb being removed, the bandage is drawn as firmly as desired and brought up and passed into the right hand and the reverse repeated.

They should be continued as long as the limb increases in size, but when it is stationary or a decrease occurs, then the part can be covered by a slow spiral and no reverses should be made. Thus, the reverses should cease in the leg when

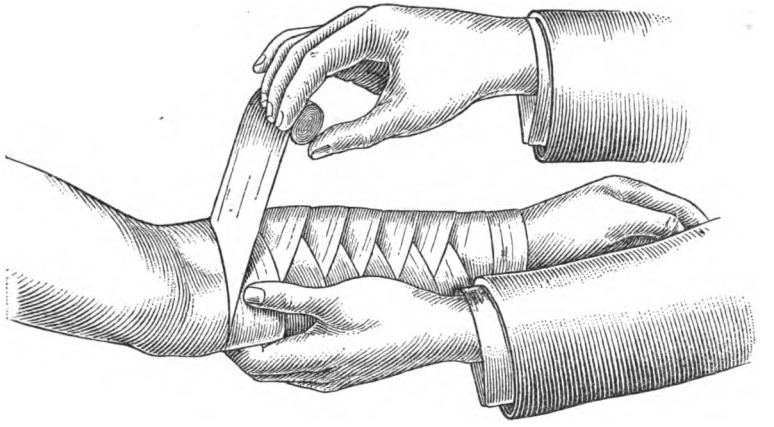

FIG. 18.—THE SPIRAL REVERSE. THE ROLLER REVERSED.

the point of greatest circumference of the calf is reached, and in the forearm before the elbow is reached.

In bandaging a conical part the reverse is always made toward the small end or point of the cone. The conical parts of the extremities on which reverses are necessary are all pointed downward, so that the reverse is made *toward* the operator and while the bandage is proceeding from the point toward the base of the cone. A reverse made away from the operator and while the bandage is proceeding from the base toward the point of the cone is never allowable. It is taught

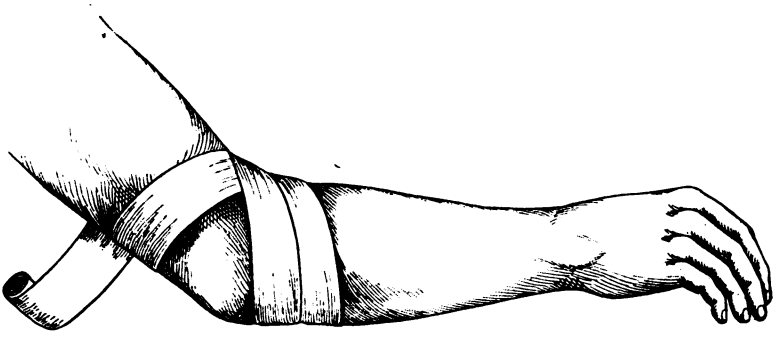

FIG. 19.—FIGURE 8 BANDAGE.

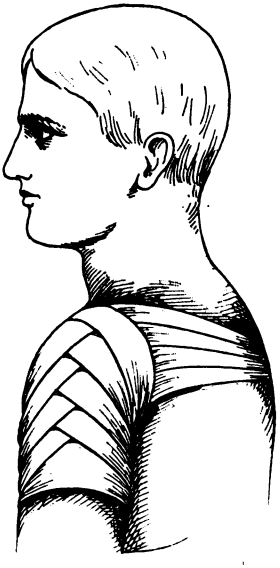

FIG. 20.—SPICA BANDAGE.

by many, particularly the French, but the only descending cones we have in the body can be better bandaged by slow spiral turns.

In applying gauze and plaster-of-Paris bandages reverses should be avoided; figure 8 turns are preferable.

The Figure 8 Bandage.

The figure 8 principle is the one most used of any in bandaging. It consists of two loops of bandage made in the form of a figure 8. (See Fig. 19.) When a number of figure 8 turns are made, each a little higher than the preceding one, they form what is called, from its imbricated appearance or resemblance to a spike of barley, a *spica* bandage. (See Fig. 20.)

The Recurrent Bandage.

When it is desired to retain a dressing on the face of a stump, or on the top of the head, or to cover the end of a

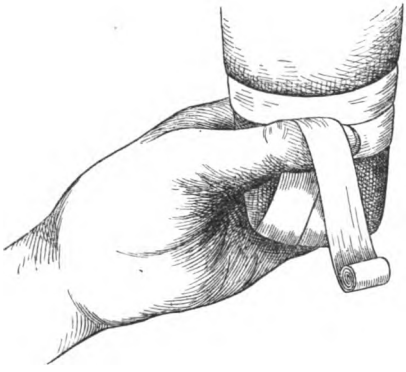

Fig. 21.—Recurrent Bandage.

finger, then a bandage called the recurrent is used. It is applied as follows: After first fixing the initial extremity

around the part, a reverse is made and the roller passed backward and forward over the end of the part until it is completely covered, and then finished by a few circular turns. The first recurrent turn goes directly across the middle of the part and each alternate turn is made on either side of it. (See Fig. 21.)

Owing to the fact that the recurrent turns are not firmly attached, this bandage is very liable to displacement and is not to be used except in cases of absolute necessity.

The Twisted Bandage.

When it is desired to secure a turn over a projecting bony prominence or small dressing, it can be done by sharply twisting the bandage on itself a half turn. The edges are thus drawn in and it more closely embraces the part. Thus,

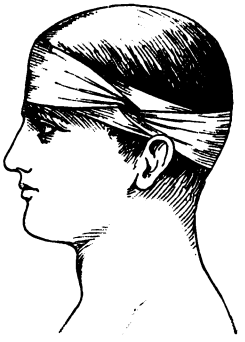

Fig. 22.—Twisted Bandage.

in children, where the frontal eminences are marked, by twisting the bandage, as seen in figure 22, it grasps the occipital protuberance behind and the frontal eminences in front. This principle may be made use of in confining small dressings to the top of the head for scalp wounds, etc.

THE KNOTTED BANDAGE.

This is made with a double roller. The body or middle portion of the bandage, that between the two rolls, is placed on a part, say one temple, and the bandage carried around to the opposite side. The two portions of the bandage pass each other and are continued around to the point of starting, where they are turned at right angles to their former course, thus forming a cross with a knot at the point of crossing (Fig. 23). They are then continued around to the opposite side, and there fastened or else carried on to form a second knot behind the first. The use of this bandage has usually been confined to the temporal region, but the same principle is applicable to other portions of the head. Thus, the knot may be placed lower down and a good bandage made for covering both eyes, or still lower to cover the upper or lower lip.

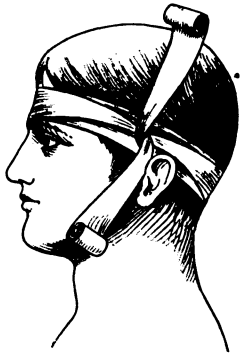

FIG. 23.—KNOTTED BANDAGE.

Gamgee's Method.—Mr. Sampson Gamgee, of Birmingham, proposed a method of bandaging by means of "a succession of intersecting spirals or figures of 8" without reverses. He describes it as follows ("Treatment of Wounds and Fractures," p. 308): "To bandage a left leg and foot, by way of illustration, begin just above the malleoli with a couple of circular turns, then over the instep, obliquely from left to right; make a circular turn at the root of the toes, and wind obliquely upward from the inner side of the foot, in front of the ankle, to the back, and thence up the front of the leg, with a long spiral to reach the knee-joint; below this make a couple of circular turns; thence downward and upward, by long intersecting spirals or figures of 8, until every part, the heel included, is smoothly covered.

This method is applicable, with trifling variations of detail, to all parts of the body, so as to exercise the most equable and comfortable pressure, without ruck or reverse, and without danger of slipping." In my hands this method consumes such a large amount of bandage that I prefer using either the figure 8 of the lower extremity, shown in figure 47, or the same bandage with a reverse made in the upper loop of the figure 8 turn on the back of the leg.

THE SPECIAL ROLLER BANDAGES.

Bandages of the Upper Extremity.

Spiral of the Finger (Fig. 24).—To cover a finger which has been enveloped by a dressing a plain spiral bandage is usually best, but reverses are necessary if the bare finger is to be bandaged. Bandage, 1 inch wide.

The initial extremity being laid lengthwise on the dressing, one or two recurrent turns are made over the end of the finger. The bandage is then reversed and carried spirally up the finger from its extremity to the web, where it is either pinned as seen in figure 24, or split and the two ends tied about the part, or tied around with a thread.

If the injury does not extend above the end joint, it is not necessary to carry the bandage beyond the root of the finger. When, however, the middle or proximal bone is injured, then it is better to prolong the bandage up around the wrist as in the following bandage.

Spiral Reversed of the Finger (Fig. 25).—Bandage, 3 yards × 1 inch.

Supposing the middle portion to be the injured part, the bandage is fixed by two circular turns around the wrist. It is then brought diagonally over the back of the hand to the

root of the injured finger, descending by a spiral turn to its tip, where a circular turn is made. The finger is then ascended by spiral reversed turns and the bandage finished by being carried across the back of the hand and fixed around the wrist (see Fig. 25) or brought down and ended around the finger.

Spica of the Thumb (Fig. 26).—Bandage, 3 yards × 1 inch.

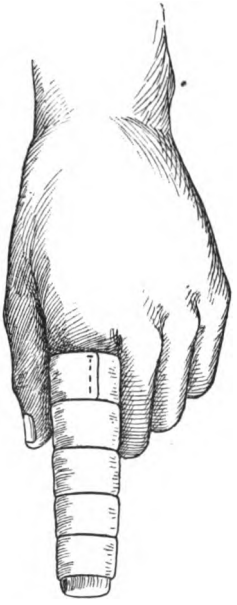

FIG. 24.—SPIRAL BANDAGE OF THE FINGER.

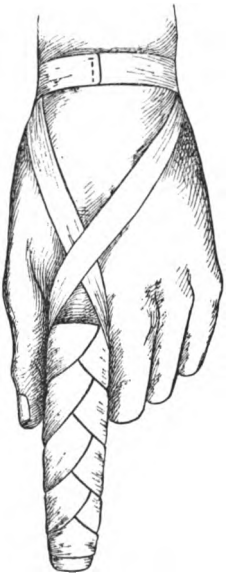

FIG. 25.—SPIRAL REVERSED BANDAGE OF THE FINGER.

The initial extremity having been fixed by one or two turns around the wrist, the bandage is carried downward across the back of the hand and wound in a rapid spiral around the thumb until near its extremity. A circular and one or two slow spiral turns are then made and the bandage continued by successive ascending figure 8 turns overlapping each other half their width and made alternately around the

thumb and around the hand. The thumb being covered, the bandage is ended around the wrist (Fig. 26).

The bandage should not extend farther forward than the middle of the thumb nail, and the figure 8 turns should commence when the lower edge of the bandage arrives at the web of the thumb. It is not necessary to concentrate the figure 8 turns all at one point on the side of the wrist, but they may be made nearly or quite parallel, as shown in the illustration.

Demi-gauntlet (Fig. 27).—Bandage, 3 yards × 1 inch.

The initial extremity is fixed by a couple of circular turns around the wrist. Then, if the left hand is to be bandaged,

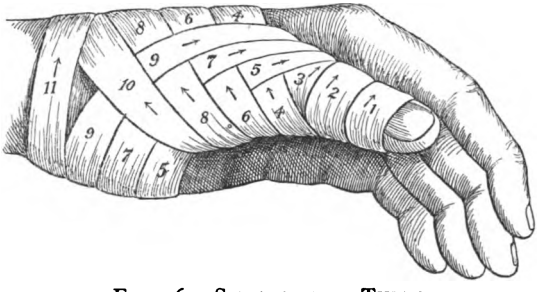

FIG. 26.—SPICA OF THE THUMB.

the roller is carried from the ulnar or little finger side of the wrist obliquely across the palmar surface to the outer side and a turn taken around the root of the thumb. The bandage is then carried obliquely across the back of the hand to the ulnar side of the wrist, thence back across the palm, and on arriving at the thumb side it is again brought downward to encircle the root of the index finger and thence up to the ulnar side of the wrist. These figure 8 turns are made alternately around the fingers and wrist until all are encircled and the back of the hand covered. The bandage is ended around the wrist.

The Gauntlet (Fig. 28).—Bandage, 5 yards × 1 inch.

The initial extremity is fixed around the wrist and, if the left hand is to be bandaged, the roller is carried across the palm of the hand to the base of the thumb. This is descended by a rapid spiral turn to its extremity, and covered by spiral or reversed turns. When the web of the thumb is

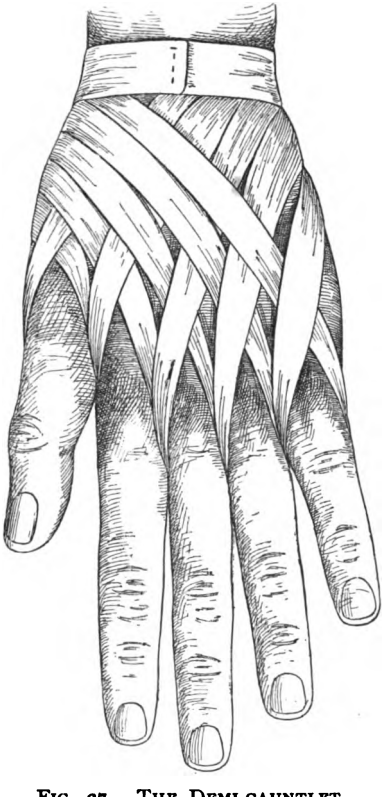

FIG. 27.—THE DEMI-GAUNTLET.

reached, the roller is carried back across the hand to its ulnar or little finger side and, a turn being made around the wrist, the bandage is brought from its thumb or radial side down across the back of the hand to bandage the index finger in the same manner. The fingers and thumb are thus covered

one after another, a figure 8 turn being made around the wrist for each finger. We thus have all the fingers covered by spiral or reversed turns and the back of the hand covered by the figure 8 turns, of which one loop encircles the root of

FIG. 28.—THE GAUNTLET.

the finger and is the accessory loop, while the other or principal one goes around the wrist.

Another method sometimes described as the gauntlet consists in bandaging the fingers as already described and then covering the hand by slow spiral turns, from the web of the fingers to the

wrist-joint. Jamain et Terrier correctly call this bandage the spiral of the hand.

Spiral Reversed of the Upper Extremity (Fig. 29).—Bandage, 6 yards × 2½ inches. To bandage the right arm.

Hand.—The initial extremity is placed obliquely on the wrist and fixed by one or two turns, as shown for the leg in figure 11. The bandage is then carried over the back of the hand to the web of the thumb and index finger, thence to the outer side of the little finger, the lower edge of the bandage crossing the hand at the level of the second joint of the ring

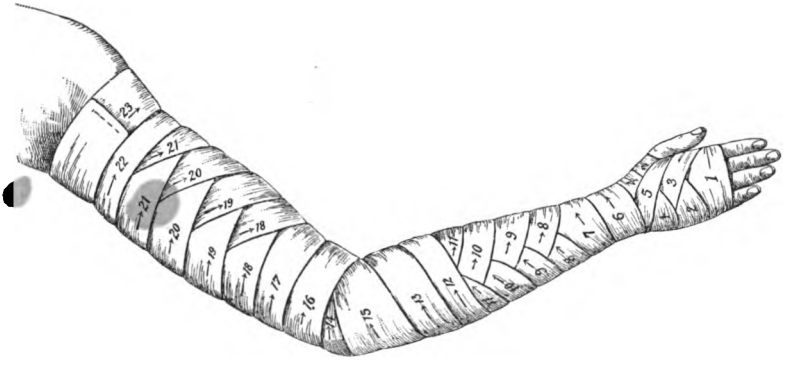

FIG. 29.—SPIRAL REVERSED OF THE UPPER EXTREMITY.

finger. (See Fig. 30.) A circular turn is made at this point, the bandage being carried around, and as it crosses the little finger for the second time, it covers only one-half of the previous circular turn (Fig. 31). It is then carried obliquely upward across the back of the hand to the knuckle of the thumb (Fig. 31). Returning across the palmar surface again to the ulnar side, another turn is taken around the hand below the thumb, covering as it passes over the index finger one-half of the circular turn, and the bandage again brought to the ulnar side, as seen in figure 32. Alternate turns are thus made around the hand above and

below the thumb, until it is covered in by two or three figure 8 turns, each of which overlaps the preceding one-half of its width. The points of crossing should be near the middle of the hand and be kept as much as possible in the same straight line. The last turn below the thumb should fit well up between the thumb and forefinger, the bandage wrinkling at this point.

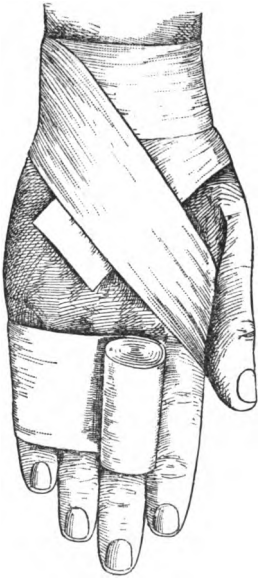

FIG. 30.—COVERING THE HAND. FIRST TURN AROUND THE FINGERS.

It is sometimes taught to cover the hand by two or three spiral reversed turns before proceeding to the figure 8 ones. As these reverses are easily displaced and are not absolutely necessary, it is better to dispense with them. Prof. H. H. Smith ("Surgery," 1863) also taught to bandage the hand without them.

Forearm.—The bandage is then carried up the wrist and forearm by three or four slow spiral turns, and reverses made when the arm increases in size. (See Fig. 33.) These reverses

are continued until within five inches of the elbow. They should then be discontinued, and, the forearm being flexed, the bandage carried directly over the point of the elbow, the point of the olecranon being in the middle of the bandage. (See Fig. 33.) Thence it is brought back to the forearm, covering in one-half of the last turn (turn 3, Fig. 34) and carried again around the lower portion of the arm (turn 4,

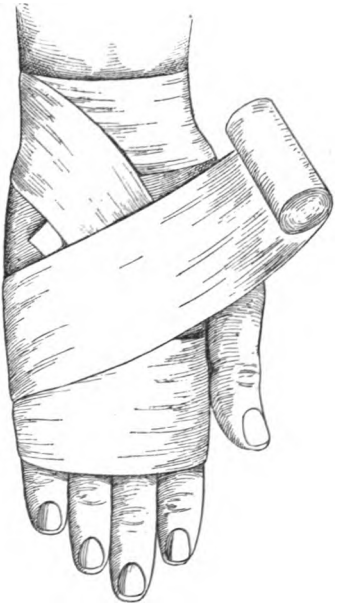

FIG. 31.—COVERING THE HAND, SECOND TURN PASSING OBLIQUELY UPWARD ACROSS THE BACK.

Fig. 34), the lower edge of the bandage being just above the point of the olecranon, and therefore covering in one-half of turn 2. The bandage is then continued up the arm (turn 5).

Arm.—The bandage is then passed around the arm, ascending it in slow spiral or spiral reversed turns, as required.

The completed bandage is shown in figure 29.

When the elbow is not much flexed, three turns may be

sufficient to cover it, as shown in figure 34, otherwise five may be required.

It will be seen from this that the elbow is covered in by figure 8 turns, the upper loop in each being around the arm and the lower loop around the forearm, the point of crossing being the bend of the elbow. The turns which are lowest on the forearm are also lowest on the arm.

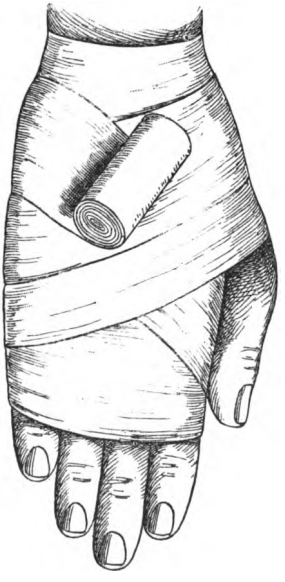

FIG. 32.—COVERING THE HAND; COMPLETING THE BANDAGE.

Another good method consists in fixing the initial extremity by two or three circular turns around the point of the elbow and then making successive figure 8 turns above and below the joint, receding from the point of the elbow up the arm and down the forearm.

Some authors (E. Fischer, "Allgemeine Verbandlehre"; Leonard, "Bandaging") advise using figure 8 turns which begin at a distance and approach the joint, the last turn (instead of the

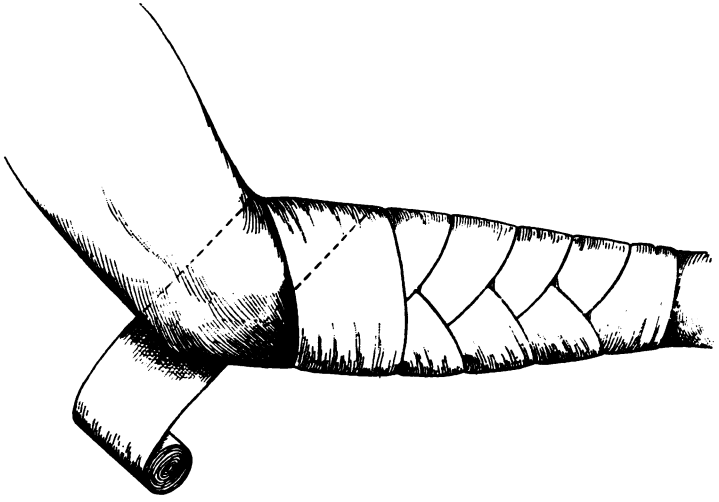

FIG. 33.—SPIRAL REVERSED OF THE FOREARM AND BEGINNING OF THE FIGURE 8 OF THE ELBOW.

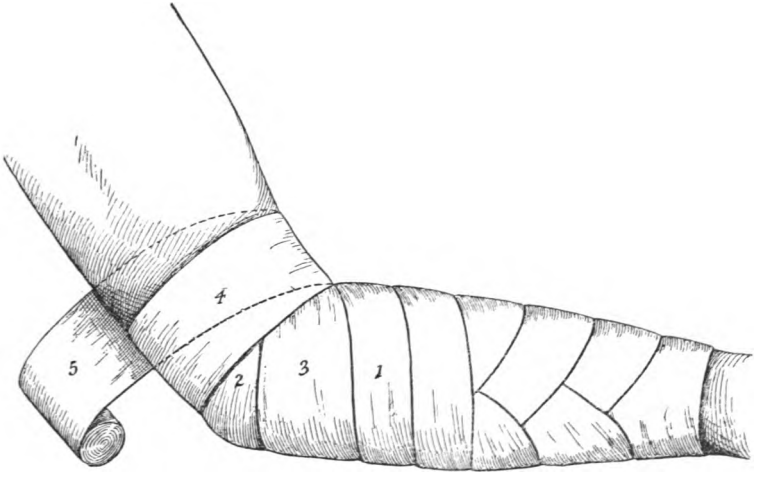

FIG. 34.—FIGURE 8 OF THE ELBOW, COMPLETED.

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first) passing over the point of the olecranon. The turn of the bandage most liable to displacement is that which passes over the point of the olecranon process. As this is secured by other turns of the bandage in the previously mentioned methods, they are to be preferred.

Figure 8 of the Upper Extremity (Fig. 35).—Bandage, 8 or 9 yards × 2½ inches.

The hand and wrist having been covered in by figure 8 and slow spiral turns, as already described, the bandage is inclined up the arm and a turn taken around it. It is then brought downward and another turn taken around the part.

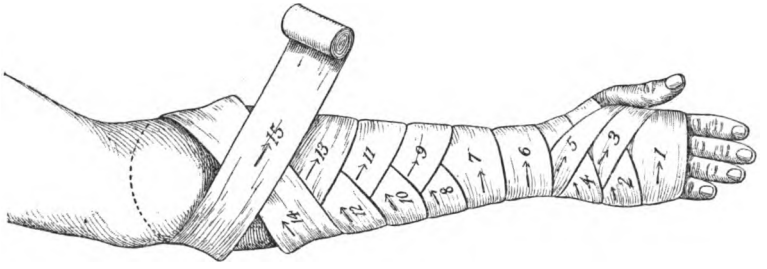


FIG. 35.—FIGURE 8 BANDAGE OF THE UPPER EXTREMITY, NO REVERSES BEING USED.

Thus a figure 8 turn is made in which the lower loop is the principal one and must be made to lie flat on the part, while the upper one is the accessory loop and gapes at its lower edge as seen in figure 35. This gaping is concealed by the lower loop of the next figure 8 turn. Successive figure 8 turns are to be made, each overlapping the preceding one until the entire limb is covered, when the bandage is completed by one or two circular turns. If it is desired to avoid the gaping of the upper turn, a reverse may be made on the under side of the limb, and both loops will then lie flat.

When a very secure bandage is desired, this one may be used. On account of the arm being carried in a sling, there is not the

same tendency for the bandage to become displaced as exists in the lower extremity. If it is desired to have the arm flexed, the bandage should be applied while it is in that position and it is not to be bandaged while straight and afterward bent. By so doing the bandage is tightened at the flexure of the elbow and interference with the circulation results.

Spica of the Shoulder (Ascending, Fig. 36).—Bandage, 8 yards × 2½ inches.

The initial extremity is fixed around the arm at its mid-

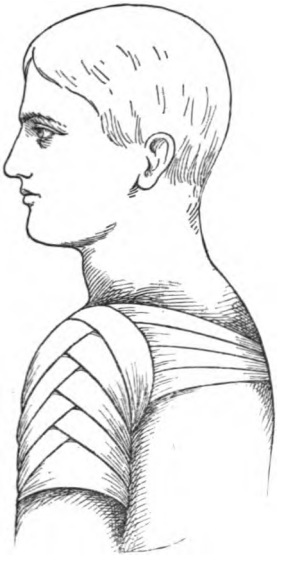


FIG. 36.—SPICA OF THE SHOULDER.

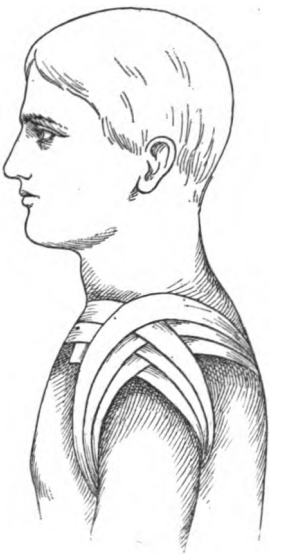


FIG. 37.—FIGURE 8 BANDAGE OF THE SHOULDER AND AXILLA.

dle. One or two spiral or spiral reversed turns are made until the bandage reaches the axillary folds. It is then carried around the chest, through the opposite axilla or armpit, and returned to the arm, where it crosses the previous turn on the outer side *midway between the anterior and posterior surfaces*. Another turn is made around the humerus and then

again around the body. Several turns are thus made around the arm and through the opposite axilla, the points of crossing being in line with the tip of the shoulder. The successive turns rise higher and higher, overlapping each other one-half to two-thirds the width of the bandage, until the shoulder is entirely covered. (See Fig. 36.)

If the turns around the body are begun before the axillary folds are reached, the arm will be unduly bound to the side. These turns all concentrate themselves at a single point in the sound axilla, radiating from it like a fan both on the front and back of the chest. In applying this bandage the operator should stand exactly at the side of the patient and neither toward the front nor back. If this is neglected the points of crossing of the turns over the affected shoulder are apt to be thrown too far forward or backward, thus making an insecure dressing. The bandage has a tendency to become displaced by the points of crossing slipping down either in front or behind the shoulder. It is to avoid this that they should always be made in the median line of the arm. When, instead of the figure 8 turns being begun below and made to ascend successively higher and higher, as in the *ascending spica* just described, they are commenced high up on the neck and made to descend, then the bandage is called the *descending spica.* It is preferred by some authors, but in this country the ascending is the more popular. Goffrés ("Précis iconographique des bandages," Paris, 1854) prefers the descendent, as he claims it to be more solid and regular than the ascendant.

Figure 8 of the Shoulder and Axilla (Fig. 37).—Bandage, 3 yards × 2½ inches.

The initial extremity being placed on top of the shoulder of the affected side, the bandage is carried under the affected axilla and up over the shoulder, crossing the initial extremity. From there it is carried under the axilla of the opposite side and back again to the affected shoulder. Two or three figure 8 turns composed of alternate loops under the two axillæ and crossing on the shoulder of the affected side con-

stitute the bandage. The turns cover each other one-half to two-thirds of their width. (See Fig. 37.) The extremity may be pinned where the bandage finishes or may be wound around the arm.

If preferred, instead of carrying the bandage to the opposite axilla, it may be passed around the neck, making a *figure* 8 *bandage of the neck and axilla.* It is a useful bandage to retain dressings in the axilla.

Bandages of the Lower Extremity.

Spiral Reversed of the Lower Extremity (Figs. 38 and 39). —Bandage, two rollers, each 7 yards × 2½ inches.

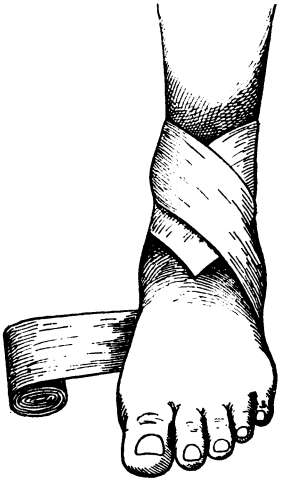


Fig. 38.—Fixing the Initial Extremity.

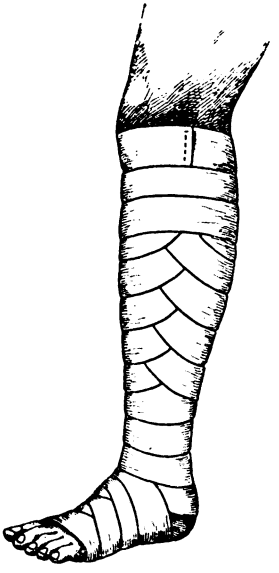


Fig. 39.—Spiral Reversed Bandage of the Lower Extremity.

The initial extremity of the bandage is placed obliquely across the ankle-joint and fixed by one or two turns, as

shown in figure 38. The bandage is then carried (if on the left foot) down the outer side of the foot, obliquely across the sole to the ball of the big toe, and over across the root of the toes, but not encroaching on them (see Fig. 39); thence around the outer border of the foot and again across the sole to the inner side. The bandage being carried on the instep, a reverse is made. If necessary, this is repeated and the next turn brought up around the ankles, encircling them low down. From here it proceeds down around the foot and again up around the ankle, whence it proceeds in slow spiral turns up the leg. We thus have the foot covered in by first a circular turn, then from one to three spiral reversed turns according to its length and the width of the bandage, and finally a couple of figure 8 turns around the ankle. Each turn covers the preceding one half its width. After two or three slow spiral turns the leg begins to increase in diameter and reverses are again necessary. These are made as long as the leg increases in size, but when the point of greatest circumference is reached, the reverses are stopped and the bandage completed by slow spiral turns. If it is desired to cover the knee and thigh also, the leg being in an extended position, when the lower border of the patella or knee-cap is reached, the bandage is passed directly across it (Fig. 40). The next turn is then made over the upper half of the patella, covering in one-half of the preceding turn, and then over the lower half, covering the remainder of the turn over the patella. The bandage is then carried up the thigh by regular spiral or reversed turns.

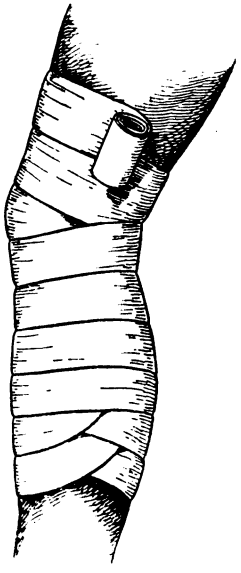


FIG. 40.—FIGURE 8 OF THE KNEE.

When the foot is short or the bandage broad, it is not necessary to make any reverses, and the figure 8 turns should be commenced immediately after the circular turn around the root of the toes has been made. The first figure 8 turn encircles the ankles low down, leaving the heel exposed; alternate turns are then taken around the foot and the ankle, those on the foot approaching the heel and those around the ankle ascending the leg, each being half the width of the bandage higher than the preceding one. As with the hand,

FIG. 41.—SPIRAL OF THE HEEL. FIRST TURN OVER THE POINT.

FIG. 42.—SECOND TURN ACROSS THE RIGHT SIDE OF THE HEEL.

so with the foot, it is always better to dispense with reverses when possible.

To Cover the Heel.—If it is desired to cover the heel, either the spiral of the heel or spica of the foot can be used.

The former was called by the late Dr. Chas. T. Hunter the "American spiral" (Ashhurst's "International Encyclopedia of Surgery," vol. I). It was so named not because of its American origin, for the turn which is peculiar to it is seen in Galen and many of the older French works, and it is also known in Great Britain and Germany, but because it was recognized and used more by the Americans than any others; also because it has been taught continuously here for more than thirty-five years, while even yet it is comparatively

seldom mentioned in the foreign works on surgery. It is applied as follows, a bandage 2½ inches wide being used:

Spiral of the Heel (Figs. 41, 42, 43, and 44).—To bandage the left foot.

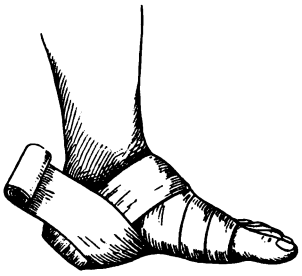


FIG. 43.—SECOND TURN ACROSS THE RIGHT SIDE OF THE HEEL.

FIG. 44.—COMPLETED SPIRAL BANDAGE OF THE HEEL.

The initial extremity having been fixed around the foot or ankle, the bandage is carried under the sole of the foot to its inner side. A circular turn is then made, the lower edge of

FIG. 45.—SPICA OF THE FOOT, THE FIRST FIGURE 8 TURN GOING OVER THE HEEL.

FIG. 46.—SPICA OF THE FOOT, COMPLETED.

the bandage not coming farther forward than the root of the toes. The foot is ascended by one or two spiral reversed turns until the top of the instep is reached. Thence it is taken directly over the point of the heel, returning to the

place of departure on the instep (Fig. 41); it is then carried down the outer side of the foot (Fig. 42) to the sole and transversely across the inner surface of the heel (Fig. 43) behind the tendo Achillis, and back again to the instep (Fig. 42). From the instep it is next carried down the inner side of the foot, under the sole, and transversely across the outer surface of the heel, behind the tendo Achillis and up in front of the ankle-joint, whence it proceeds up the leg (Fig. 44). A pin is then inserted on each side of the heel where the transverse turns cross the turn going over the point.

Spica of the Foot (Figs. 45 and 46).—Bandage, 6 or 7 yards × 2 inches.

The initial extremity being fixed by two circular turns at the root of the toes, the bandage is inclined upward and carried across the instep and directly over the point of the heel. From there it is brought back to the instep and carried around the foot, covering in two-thirds of the preceding turn. (See Fig. 45.) Another turn is then made around the heel, covering two-thirds of the first turn over its point. Successive turns are then taken around the foot and around the back of the heel, those on the foot approaching the heel (turns 1, 3, 5, 7, 9), and those back of the heel ascending the leg (turns 2, 4, 6, 8, 10). (See Fig. 46.)

On account of the tendency of the turns over the heel to displace themselves by slipping up on the tendo Achillis, it is best to apply padding at this point, also beneath the malleoli. By this means the turns are rendered more secure and the prominent malleoli are protected from pressure. It is usually impracticable to bring the turns around the foot so far up as to meet the first turn over the heel; therefore a small space is often left uncovered on the sole of the foot at this point. If properly applied with padding over the tendo Achillis, this makes a neat and moderately secure bandage.

Figure 8 of the Lower Extremity (Fig. 47).—The lower extremity can be covered without any reverses by employing the figure 8 bandage. The figure 8 turns are made wherever

reverses would otherwise be used. When the leg begins to increase in diameter so that the plain slow spiral turns no longer lie flat, then the bandage is inclined upward and a turn taken around the leg; the roller being brought down crosses the first turn a little to the outside of the sharp edge of the shin bone. The upper and lower turns are separated on the back of the leg by an interspace, and each turn is made to cover the upper half of the previous one. (See Fig.

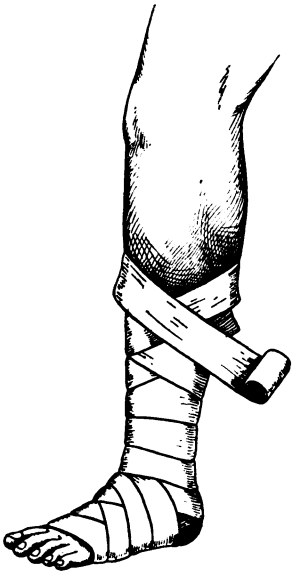


FIG. 47.—FIGURE 8 BANDAGE OF THE LOWER EXTREMITY.

47.) The lower loop applies itself flat on the surface of the part, while the upper one only touches it by its upper edge, the lower edge gaping widely, as shown in figure 47. No attention is to be paid to the upper turn, as it is entirely covered by the succeeding lower ones. Continue these figure 8 turns until the leg ceases to increase in size, then ascend to the knee-joint by two or three slow spiral turns. If desired, the knee can be covered by the same figure 8 turns

as were applied to the leg, and the bandage continued in the same manner up the thigh.

This bandage is much admired and employed. Its chief value lies in its security from displacement, and when patients are compelled to use the limb much, it can be employed with advantage. Its disadvantages are that it requires a larger amount of bandage than the spiral reversed and covers the part with many thicknesses of material. It uses from fifty to one hundred per cent. more bandage than the spiral reversed, according to the amount of overlapping. In bandaging the leg up to the knee, as there are only five or six reverses made, using the figure 8 turns instead would add a couple of yards to the total length of the bandage. In patients confined to bed the spiral reversed is usually secure enough. By making a reverse on the under side of the limb in the upper loop its gaping may be avoided and the bandage will lie flat on the part through its entire length.

In bandaging the leg between the ankle and the knee about ten turns are needed. Three turns, plain spiral in character, are used to cover its lower portion above the ankle. This part is practically a cylinder. It does not increase sufficiently in size to require a sudden change in the direction of the bandage to make it lie flat, therefore it is positively wrong to make reverses here, and it is unnecessary to make figure 8 turns. Plain slow ascending spiral turns are best. The same condition exists from the largest part of the calf of the leg to the knee-cap or bend of the knee. Here the decrease in size is so small that the part can also be treated as a cylinder and bandaged like the part just above the ankle with three slow ascending spiral turns. Here, likewise, reverses are positively wrong and figure 8 turns unnecessary. The remaining portion, embracing approximately the middle half of the leg, increases so rapidly in size that it forms a cone which requires a special mode of applying the bandage in order to make the turns lie flat on the parts. This is accomplished either by making reverses or figure 8 turns as already described. If the gaping of the upper loop of the figure 8 turn is objected to, it can be avoided by making a reverse on the back of the limb. The making of this reverse on the back of the limb can readily be acquired by little practice. If it is desired to make the bandage

especially secure, the figure 8 turns may be made longer than usual. By so making them and using a reverse on the back of the limb in the upper loop we have the best bandage for this part of the body. The method of Gamgee, by winding the bandage somewhat indiscriminately up and down the leg, has already been alluded to (page 39). Other methods have been proposed. One consists in making long figure 8 loops, one below and one above, approaching to the point of greatest diameter of the calf, where the bandage is ended by a circular turn. Another consists in making long figure 8 turns all the upper loops of which go above the point of greatest diameter and are passed once circularly around the limb before again coming down the leg to form the next figure 8 turn. This consumes an unnecessary amount of bandage, which is massed around the leg just below the knee-cap. Security from displacement of the bandage in walking cases is to be acquired either by placing adhesive strips obliquely across the turns, or better, by having the patient tack the turns together by means of a needle and thread.

To Bandage the Knee.—The knee can be bandaged while in a straight position, either by the bandage described under the spiral reversed of the lower extremity and shown in figure 40, or by that described under the figure 8 bandage of the lower extremity, preferably the former. When, however, it is desired to cover it while in a slightly flexed position, three turns may not be sufficient and five may be required.

Spica of the Groin.—*Ascending* (Fig. 48).—Bandage, 8 yards × 2½ or 3 inches.

The initial extremity is fixed by two circular turns around the thigh, well up to the perineum or crotch. If the right groin is to be bandaged, on reaching the outer surface of the thigh, the roller is inclined obliquely upward and carried across the pubes to the top of the left thigh-bone, thence horizontally across the back, around the upper edge of the right thigh-bone, and down parallel with the fold in the groin, crossing the first turn slightly to the inner side of the median line of the thigh, *taking care to leave no point uncov-*

ered between the circular and oblique turns. It then passes around the thigh to its outer side, covering in one-half of the previous turn. Two or more additional figure 8 turns are then made, each parallel to the first and covering the previous turns one-half. The last turn encircles the crest of the hip-bone. (See Fig. 48.)

The point of crossing being the essential part, care should be taken that it is not cast too far out, thus making a spica of the hip rather than a spica of the groin. The turns around the body

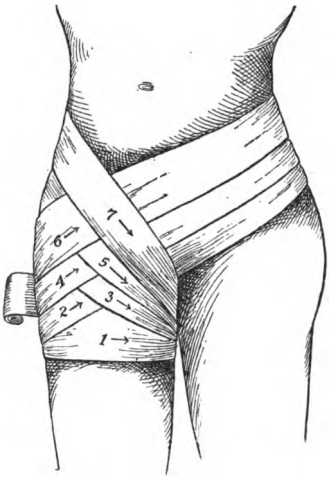


FIG. 48.—SPICA BANDAGE OF THE GROIN.

should encircle the pelvis and not the abdomen above the iliac crests. The bandage is thus made independent of and unaffected by the motion which takes place between the pelvis and the spine.

When the bandage is applied as above described, it is called the ascending spica, because the turns cover the part by ascending from below upward. When, however, it is desired to cover the part by the *descending spica*, the first turn, instead of beginning low down, is passed high up and each succeeding one is made parallel to and beneath it until the bandage is completed.

Goffrés says he sees no reason to prefer one to the other. When

a part or dressing is to be supported, it is better to do it with a turn which passes from below upward rather than to use one from above downward. For this reason it is more correct to make the spicas by carrying the bandage from the inner to the outer side of the limb. As this necessitates using the left hand instead of the right, an accomplishment possessed by few, the usual method has been described and illustrated.

Double Spica of the Groin (Figs. 49 and 50).—Bandage, two rollers, each 6 yards × 2½ or 3 inches.

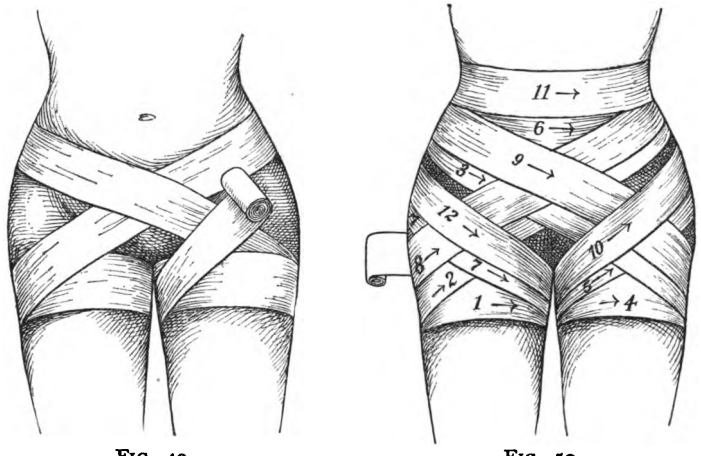


FIG. 49. FIG. 50.

FIGS. 49 AND 50.—DOUBLE SPICA BANDAGE OF THE GROIN.

Fix the initial extremity by two circular turns around the right thigh well up to the perineum. Carry the bandage from the outer surface of the thigh obliquely upward across the pubes to a point low down on the opposite side of the waist. Thence across the back to the same place on the patient's right side, then obliquely downward to the outer side of the left thigh, crossing the former turn in the median line of the body below the umbilicus or navel. Take a circular turn around the thigh and, on the arrival of the bandage at its inner side for the second time, bring it obliquely upward and

outward (Fig. 49) and carry it over the most prominent part of the hip (turn 5, Fig. 50); then obliquely up across the back and around the waist (turn 6). Thence proceed down across the back over the right hip low down (turn 7), crossing turn 2 in the middle line on the front of the thigh; carry it around the thigh to its outer side (turn 8), half the width of the bandage above turn 2 and parallel to it. Proceed up across the abdomen, around the body, and bring the roller down across the abdomen (turn 9), parallel to and half the width of the bandage above turn 3, around the back of the left thigh, upward and outward around the left hip (turn 10), across the back to the waist, around the waist (turn 11), then down across the back to the right hip, obliquely down over the right groin (turn 12), and end the bandage either by winding it around the right thigh or taking a turn around the abdomen.

In making the first oblique turn after fixing the initial extremity, care should be taken to keep it well down on the groin as otherwise a space will be left uncovered between the circular turn around the thigh and the two oblique turns immediately above it. The points of crossing over the groins should not be thrown too far out, and those on the abdomen should be as near as possible in the median line of the body. If, in commencing the spica bandages of the groin, the initial extremity is fixed too low down, then the bandage should be carried up by spiral or spiral reversed turns until its upper edge nearly or quite touches the perineum. If this is not done the turns will, nevertheless, slip up to that point, thus loosening the bandage. The spicas of the groin can also be begun by fixing the initial extremity around the abdomen, but greater security is obtained by fixing it on the thigh. The double spica can also be made in a descending manner.

Crossed Bandage of the Perineum (Fig. 51).—Bandage, 8 yards × 3 inches. Fix the initial extremity high up on the left thigh (turn 1) and continue it from the under surface

of the thigh across the perineum (turn 2) rather low down on the right hip (turn 3); thence across the back to a similar point on the opposite side (turn 4) and down in front of the left hip across the perineum, turn 5 crossing turn 2 in the middle line. The bandage is then carried to the outer portion of the thigh and up around the waist (turn 6 and 7). Bring it down across the back, around the right hip (turn 8), half the width of the bandage above turn 3 and parallel to it. Continue across the perineum (turn 9)

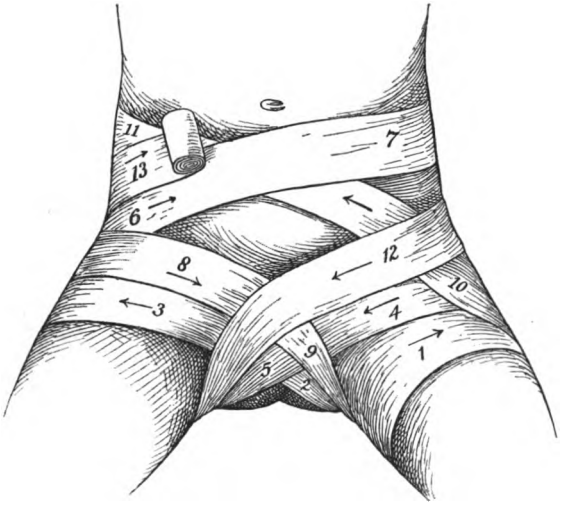


FIG. 51.—CROSSED BANDAGE OF THE PERINEUM.

in front of turn 2, around the thigh to its outer side (turn 10), up around the opposite side of the waist (turn 11), down across the back, around the left hip (turn 12) half the width of bandage above turn 4, across the perineum, around the left hip and waist (turn 13), to end by a couple of circular turns around the body.

This bandage is used to retain dressings to the perineum, particularly after operations, such as external urethrotomy, median

lithotomy, etc. The dressing can be perforated to allow the drainage-tube from the bladder to protrude. It is more secure and gives greater pressure than does the four-tailed sling often used for similar purposes.

Bandages of the Head.

In commencing a head bandage the initial extremity may be laid on one temple and fixed by a couple of circular turns, or it may be made more secure by applying it as follows: Al-

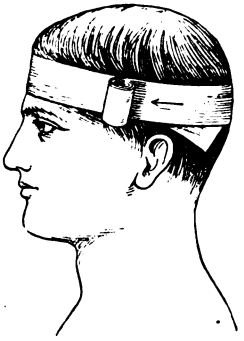


Fig. 52.

Fig. 53.

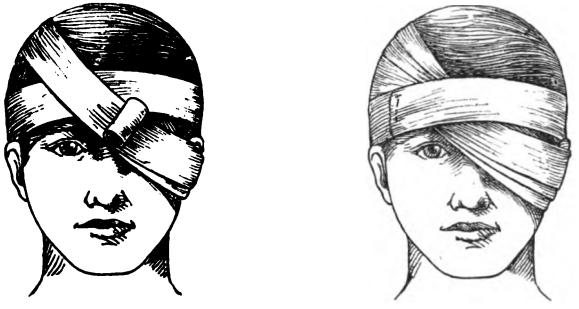
Figs. 52 and 53.—The Method of Fixing the Initial Extremity in Head Bandages.

low the end of the bandage to project down and behind the ear while a circular turn is made around the head, as seen in figure 52. The projecting end of the bandage is then turned up and covered, as seen in figure 53, by the next circular turn and the bandage then proceeded with.

The Monocle or Bandage for One Eye (Fig. 54, *a* and *b*).—Bandage, 5 yards × 2 inches.

To bandage the left eye: Place the initial extremity on the left temple and fix, by a circular turn, around the head from left to right. On arriving for the second time above the right ear, the bandage should be carried down behind the

back of the head, under the left ear and cheek prominence, and up in front of the left eye, the lower edge crossing the root of the nose. From there it is taken over the top of the side of the head and again to the back of the head. A second turn is made covering in the preceding one half the width of the bandage higher up on the cheek (Fig. 54, *a*) and lower down on the head. A third turn, still higher on the cheek and lower on the head, may be applied if thought desirable. The bandage is completed by one or two horizontal circular turns around the head (Fig. 54, *b*).



a. *b.*

FIG. 54.—THE MONOCLE OR BANDAGE FOR ONE EYE.

The tip of the ear on the bandaged side should be allowed to project, or if covered in should be protected from pressure by cotton.

The horizontal turns should rest on the cartilages of the ears and cover each other exactly.

If the right eye is to be bandaged the initial extremity should be placed on the left temple and the bandage carried from the operator's right to left around the forehead.

Among the various ways of bandaging the eyes the following may be mentioned: Instead of the oblique turns crossing at the root of the nose, they may all be made parallel to each other. This can only be done if the bandage is either very

narrow or very elastic. Sometimes a circular turn is taken after each oblique one; this is unnecessary. The French have a way of covering the eye by reversing the oblique turns on the forehead, instead of carrying them on over the scalp, but it is too insecure to be recommended.

Binocle or Bandage for Both Eyes.—When both eyes are to be bandaged it can be done with either a single or a double roller.

Binocle with a Single Roller (Fig. 55).—The initial extremity being fixed around the forehead, the left eye is bandaged as already described above. After the finishing circular turn

FIG. 55.—BINOCLE OR BANDAGE FOR BOTH EYES.

has been made it is pinned at the back of the head and the roller brought upward over the left side of the head, down across the root of the nose, and over the uncovered right eye. This is covered by two or three radiating turns, precisely as was done to the left eye, only instead of the body of the bandage being carried upward from the face over the scalp, it is carried downward from the scalp over the eye. The bandage is completed by one or two horizontal circular turns (Fig. 55).

Binocle with a Double Roller.—The middle of the bandage is placed on the forehead and the two rolls carried around immediately above the ears, crossed at the back of the head,

and each brought forward under the corresponding ear, then up over the eyes, crossing at the root of the nose, over the sides of the head, crossing again at the back of the head, then forward over the eyes, covering one-half the preceding turn, crossing again at the root of the nose, thence over the side of the head one-half the width of the bandage lower than the preceding turn. On arriving at the back of the head the bandage is directed horizontally around the head and finished by one or two circular turns made with the longer end. If the ears are to be covered they should be protected from pressure by cotton.

FIG. 56.—TRANSVERSE BANDAGE FOR ONE EYE.

This bandage is more secure than that made with the single roller and on that account is to be preferred.

Transverse Monocle or Bandage for One Eye (Fig. 56).—Bandage, 2 yards × 2½ inches.

Place the initial extremity above the right ear and fix by two turns carried around the head in front of the eyes and above the ears. On arriving at the back of the head for the second time, pin and reverse the bandage bringing over the scalp, passing it down under the horizontal turns, and pull it up until the eye is exposed as shown in figure 56, when the bandage is pinned.

Oblique of the Jaw (Figs. 57 and 58).—Bandage, 5 yards × 2 inches.

To bandage the left side of the jaw: Place the initial extremity on the right temple and fix by one or two horizontal circular turns from left to right. On arriving above the left ear the bandage is directed downward across the back of the neck (Fig. 57), under the jaw and up the left side of the face, the anterior edge of the bandage not projecting quite so far forward as the outer angle of the eye. (See Fig. 58.)

From there it is carried over the head, down back of the right ear, again under the jaw and three or four similar vertical turns made, each overlapping the preceding on the affected side, one-half to two-thirds of its width; while on the sound side behind the ear they cover each other exactly (Fig. 57). On the arrival of the last turn above the right ear, the bandage is pinned and reversed, to be finished by being carried once or twice around the head. Pins should be inserted at the points of crossing of the vertical and horizontal turns.

FIG. 57.

FIG. 58.

FIGS. 57 AND 58.—OBLIQUE BANDAGE OF THE JAW.

This is the old single chevestre or halter bandage of the French and is intended for fractures of the condyle of the lower jaw or for dressing applied to the ear or parotid region. The vertical turns may be carried farther forward or backward according to the necessities of the case. Some surgeons were accustomed to make turns over the front of the jaw, but Gerdy ("Traité des Bandages," p. 215) advises against this as tending to displace the fragments backward. Others overlap the turns from behind forward, as this tends to push the jaw forward.

Double Oblique of the Jaw.—*Double Halter Bandage or Double Chevestre.* (Fig. 59.) This is best made with a double roller. The same turns may also be made with a single

roller, but it is not so secure as the former, although more convenient. Bandage, 7 yards × 2 inches.

Place the middle of the bandage on the forehead and carry both rollers to the nape of the neck. Cross at this point and bring them forward under (not on) the chin, cross again and proceed up the sides of the face, the anterior edge of the bandage coming as far forward as the external angle of the eye. On arriving on top of the head, the bandage is again crossed and each roller returned to the nape of the neck. They are then again brought forward under the chin, up the sides of the face, crossed on top of the head, and taken back

FIG. 59.—DOUBLE OBLIQUE OF THE JAW.

to the nape of the neck. These turns may be repeated once or twice if desired. Each succeeding turn as it crosses the top of the head is slightly behind the one in front of it. The bandage should be finished by a circular turn around the forehead. (See Fig. 59.)

This is a good bandage to retain dressings to both sides of the face. Gerdy (*loc. cit.*, p. 216) made reverses on the top of the head in order to make it lie flat. This is hardly necessary. He also tied the ends at the back of the neck instead of pinning. Thillaye, "Traité des bandages et appareils," made it with a single roller.

Recurrent of the Head (Fig. 60).—Bandage, 5 yards × 2 inches.

Fix the bandage by two horizontal turns. On arriving at the forehead, a pin is inserted and the bandage reversed and carried in the median line back to the occiput; here it is again pinned and brought forward, covering in one-half of the median turn. It is then carried backward and forward, first on one side and then on the other, until the scalp is covered. (See Fig. 60.) The bandage is completed by one or two horizontal circular turns. Each antero-posterior turn may either be pinned as it is made or held in place by an

FIG. 60.—RECURRENT BANDAGE OF THE HEAD, WITH SINGLE ROLLER.

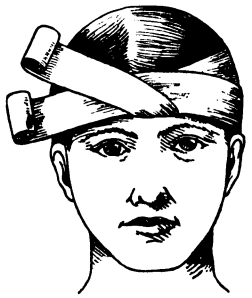


FIG. 61.—RECURRENT BANDAGE OF THE HEAD, WITH DOUBLE ROLLER.

assistant until the bandage is completed. The former way is the better.

Recurrent of Head with the Double Roller.—Capeline bandage (Fig. 61).

This requires a double roller about 6 yards long, one roll being a little larger than the other. The center of the bandage is placed on the forehead and the two cylinders are carried to the occiput, or back of the head, the smaller being underneath. The smaller one is then reversed and carried around the side of the head, covering one-half of the circular turn, the larger continuing its way circularly around the head. On arriving at the forehead, the smaller is again crossed by the larger cylinder and a second reverse is made, the band-

age being carried around the opposite side of the head (Fig. 61). The shorter roller is then carried alternately from side to side over the scalp until it is all covered in, while the larger roller travels horizontally around it, binding in each antero-posterior turn as it arrives at the occiput and forehead. The bandage is completed by one or two circular turns around the forehead with the longer roller.

These two recurrent bandages of the head are so insecure that, in the rare cases where it is necessary to cover the entire scalp with a roller bandage, the transverse recurrent, given further on, is preferred. In applying the recurrent with a single roller it is sometimes taught to completely cover in one side of the scalp before proceeding to the other, instead of making the turns on alternate sides as advised above. It will be seen that in the recurrent with the single roller the scalp is covered from the top toward the sides, while in the double roller it is covered from the sides to the top. The capeline is one of the oldest known bandages; it is said to have been found on the most ancient mummies ever discovered.

Bandage for the Front Part of the Scalp (Fig. 62).—Bandage, 3 yards × 2 inches.

When it is desired to retain a dressing in the neighborhood of the forehead, the following procedure may be adopted: The initial extremity is placed on one temple and fixed by one or two circular turns (turn 1, Fig. 62). If the bandage is carried across the forehead from the patient's right to his left side, on arriving behind the left ear on the second turn around, carry the roller downward around the occiput, covering in at the median line one-half the circular turn (turn 2), then go upward over the brow, crossing the circular turn just above the right ear and covering at the median line half its breadth. Then proceed obliquely down across the side of the head and around the nape of the neck (turn 3), covering in one-half of the last turn; then up, crossing just above the right ear, and proceed over the front of the head, overlapping

one-half of the previous turn and bringing the bandage down on the left side between the eye and the ear (turn 4). It can either be pinned and ended here or else pinned and a reverse made and finished by a horizontal circular turn. A bandage similar to this is shown in Galen's work.

The Transverse Recurrent of the Head (Fig. 63).—The front and back of the head are covered in by the bandage just described (Fig. 62) and, instead of ending at the sides of the head, the roller is then passed backward and forward transversely over the head, being pinned each time above the ears. When the scalp is entirely covered by these trans-

FIG. 62.—BANDAGE FOR THE FRONT OF THE SCALP.

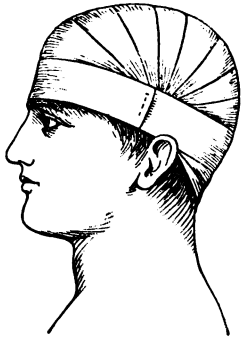


FIG. 63.—TRANSVERSE RECURRENT OF THE HEAD.

verse turns, the bandage is ended by one or two circular turns around the forehead. (See Fig. 63.)

An adhesive strap placed in the median line from the forehead to the occiput will render the bandage more secure. This bandage is much to be preferred to the other recurrents, as it is less liable to displacement and is capable of being more firmly applied.

Bandage for the Side of the Head (Fig. 64).—If it is desired to retain a dressing on the side of the head, it can be done as follows. (See Fig. 64.) Bandage, 4 yards × 2 inches.

The extremity being fixed by one or two circular turns, on

arriving at the forehead the bandage is inclined upward half the width of the circular turn and then downward until it is again level with it at the back. On arriving at the forehead again, a pin is inserted and a reverse made as shown in figure 64, the bandage being carried still higher on the side. On arriving at the back of the head it is again pinned and the bandage completed by a reverse and a circular turn.

This bandage can sometimes also be made, if the head is suitably shaped and the bandage sufficiently elastic, by inclining the roller up, without any reverse, and carrying it over the highest point on the side of the head. The next

FIG. 64.—BANDAGE FOR THE SIDE OF THE HEAD.

FIG. 65.—FIGURE 8 OF THE HEAD AND JAW.

turn is made a little lower down and the third carried directly around the head above the ears, thus ending it. This bandage has been called the *oblique of the head.*

Figure 8 of the Head and Jaw.—*Dr. Chas. T. Hunter's bandage.* (Fig. 65.) Bandage, 3 yards long × 1½ inches wide.

The initial extremity, being fixed by two horizontal circular turns around the head, the bandage is carried across the nape of the neck to the front of the lower jaw. From here it turns to the back of the neck, whence it again makes a turn around the head. Two or three figure 8 turns are thus made

and the bandage finished by a circular turn around the forehead.

This bandage, devised by the late Dr. Chas. T. Hunter, may be used in affections of the lower lip and jaw in which it is not desired to prevent opening of the mouth. It allows the patient the use of his jaws.

Figure 8 of the Head and Neck (Fig. 66).—Bandage, 3 yards × 2 inches.

The initial extremity being fixed around the forehead and

FIG. 66.—FIGURE 8 OF THE HEAD AND NECK.

FIG. 67.—OCCIPITO-FACIAL ROLLER.

occiput, two or three figure 8 turns are made alternately around the forehead and around the neck.

This bandage is of service in retaining dressings to the back of the neck. It is an old bandage and is described by both Goffrés and Thivet. Both this and the preceding bandage are made more secure by pinning the bandage at the back and then carrying it forward over the head and fastening it to the horizontal turn on the forehead.

The Occipito-facial Roller.—*Dr. D. Hayes Agnew's bandage.* (Fig. 67.) Bandage, 4 yards × 2 or 2½ inches.

Place the initial extremity on one temple and make two

or three vertical turns over the head and under the jaw. These being made, pin and reverse the bandage and carry it around the back of the head, to be fastened at the opposite temple as shown in figure 67. This bandage is described by Professor Agnew in volume I of his "Surgery."

Barton's Bandage for Fracture of the Jaw (Fig. 68).—Bandage, 5 yards × 2 inches.

Place the initial extremity on the nape of the neck just beneath the occipital protuberance, carry the roller up between the parietal eminence and the top of the ear, keeping as near to the ear as possible, thence obliquely over the scalp

FIG. 68.—BARTON'S BANDAGE.

crossing the median line in front of the highest point of the skull and proceeding down along the temple and side of the face, under the chin, up along the side of the face and over the skull, crossing the previous turn in the median line. Then proceed obliquely downward and backward between the ear and parietal eminence to the nape of the neck where the bandage crosses and fixes the initial extremity. From here it is carried forward around the front of the chin and back again to the nape of the neck, whence it proceeds up over the skull as before. Three complete turns covering each other exactly are thus made, completing the bandage, and pins inserted at the points of crossing on each side of the

chin, on top of the head and at the nape of the neck. (See Fig. 68.)

This bandage was devised by that "ingenious surgeon" Jno. Rhea Barton, and is beyond question the best of its kind. I am not aware that he ever published a description of it himself, the earliest printed account that has come under my notice being by Sargent in his book on "Minor Surgery," published in Philadelphia in 1848 and 1856. He gave the course, as did also Prof. H. H. Smith ("Surgery," vol. I, p. 116), as going over the center of the parietal bone and the point of junction of the coronal and sagittal sutures. It will be found to be less liable to displacement if the roller is carried as above directed, in front of instead of over the parietal eminences. This will cause the point of crossing to fall slightly in front of the coronal suture and the highest point of the vault of the skull. It will thus be prevented from slipping backward or upward toward the median line. Professor Agnew ("Surgery," vol. I, p. 702) gives its course as a little in advance of the parietal eminences. Care should be taken always to have the point of crossing on the top of the skull situated in the median line. Dr. Garretson ("Oral Surgery") modifies this bandage by taking a long strip of bandage, placing the middle of it beneath the chin, and carrying the two ends up and crossing them on top of the head, then to the nape of the neck, and forward to the front of the chin, where they are fastened.

Gibson's Bandage for Fracture of the Jaw (Fig. 69).—("Institutes and Practice of Surgery," 1824.) Bandage, 6 yards long × 1½ inches wide.

Place the initial extremity on the right temple and carry the roller directly over the top of the head, down in front of the left ear, under the jaw, and up in front of the right ear to the point of starting. Repeat this turn twice. On arriving at the left temple for the third time, insert a pin and reverse the bandage, carrying it backward around the occiput, along the side of the head just above the left ear, and around the occiput to the point of starting on the right temple. Repeat

this turn twice. On arriving above the left ear for the third time, incline the bandage obliquely downward and carry it around the nape of the neck. From here it proceeds under the right ear along the right side of the face, in front of the lower jaw, under the left ear, to return to the point of starting at the nape of the neck. Repeat also this turn twice. On the arrival of the bandage at the nape of the neck for the third time, pin it and make a reverse and carry the roller over the top of the head in the median line, to be fastened to the turns around the forehead, as shown in the illustration (Fig. 69). Pins are to be inserted at each point of crossing

FIG. 69.—GIBSON'S BANDAGE.

of this median with the transverse turns, and also where the vertical crosses the horizontal ones at each temple and on each side of the lower jaw.

Sédillot begins this bandage with the horizontal turns around the forehead ("Traité de Med. Op.," 1865).

The Transverse Bandage of the Scalp.—*Author.* (Figs. 70 and 71.) When it is desired to retain a dressing on the top of the head, as in scalp wounds, the following bandage is advised: A roller 2 inches wide and 2 yards long is required. Place the initial extremity above one ear and carry the roller twice around the head, inclining the bandage downward

around the occiput, so that its upper edge is level with the occipital protuberance. On arriving at the starting-point for the second time, a pin is inserted through all of the thicknesses of the bandage and the remaining portion carried over the dressing on the top of the head, down beneath the band-

FIG. 70.

FIG. 71.

FIGS. 70 AND 71.—TRANSVERSE BANDAGE OF THE SCALP.

FIG. 72.—TWISTED BANDAGE OF THE SCALP.

age on the opposite side, pulled firmly back up over the dressing again, as seen in figure 70, to be ended and pinned at the point of starting. (See Fig. 71.)

The Twisted Bandage of the Scalp.—*Author.* (Fig. 72.) When a single width of bandage is sufficient to retain the

dressing, the following may be employed: A 2½-inch roller being used, the initial extremity is placed above the right ear and the bandage fixed by being carried around the forehead. On arriving above the left ear for the second time, the bandage is twisted and carried around the back of the head over the occipital protuberance to above the right ear. Here it is again twisted and fastened with pins. This bandage is of service in children with protruding foreheads. It can also be used to retain dressings on the scalp by passing over from side to side as in the previous bandage.

FIG. 73.—THE KNOTTED BANDAGE.

The turns of these two bandages can be multiplied in number and shifted backward or forward according to the position and character of the dressing, so as to be applicable to various parts of the scalp. The object of inclining the bandage downward around the occiput is to utilize the occipital protuberance as a means of preventing upward displacement. The twisting of the transverse turn in the last bandage is to draw it in at the sides, thus forming a sort of cup, which prevents the dressing or bandage from becoming displaced.

The Knotted Bandage (Fig. 73).—Bandage, 2 to 3 yards × 2 inches, wound as a double roller.

The middle of the bandage being placed on the wounded

part (Gerdy), the two rolls are carried horizontally around the head, crossed and brought back to the point of starting. They are here crossed and carried at right angles to their former course, one going over the head and the other around under the jaw, to be fastened at the temporal region (Fig. 73).

If desired, instead of ending the bandage at this point, the two rolls can be continued to the opposite side and another knot made behind the first one, the bandage being ended around the skull. As many knots as desired can thus be made, each being cast behind the preceding one. This bandage is used to confine dressings to the temporal region, particularly when pressure is desired.

By making the knot farther down, the bandage can be carried across the eyes. Making the knot still lower on the face enables the bandage to be used in confining dressings to the upper or lower lip, or the angle of the mouth. In these bandages, in order to prevent the turns from becoming displaced, it is well to connect them with a strip of bandage, going from the nape of the neck to the forehead in the median line and pinned to the various turns.

Bandages of the Trunk.

Spiral of the Chest (Fig. 74).—Bandage, 8 yards × 3 inches.

Fix the bandage by two or three circular turns around the chest high up under the arms. Descend by slow spiral turns, covering one-half to two-thirds of their width, until the waist is reached. Pin the bandage at the back and bring the roller over the shoulder and down to the lowest turn in front. Here it is pinned and ended. A pin is to be inserted wherever the vertical strip crosses the horizontal turns. (See Fig. 73.)

Figure 8 of the Chest (Figs. 75 and 76).—Bandage, 2 rollers, each 6 yards × 2½ inches.

Place the initial extremity low down on the front of the chest. Carry the roller slightly downward and around the chest, the point of crossing of the lower border of the bandage being at or near the median line. It is then carried again around the chest, above the previous turn, completing the first figure 8. (See Fig. 75.) Another turn is made below, covering in the upper half of the first turn, followed by

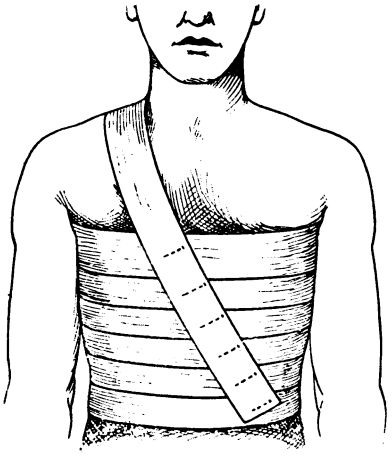


FIG. 74.—SPIRAL BANDAGE OF THE CHEST.

another higher up. Successive figure 8 turns are thus made, ascending the chest until the axillary folds are reached, when the bandage is completed by one or two circular turns (Fig. 76).

This bandage is similar to the figure 8 bandage of the upper and lower extremities, already described. The lower loop especially should be carefully applied. Each lower loop of the figure 8 turns is covered in one-half by the succeeding one, while the upper loop is entirely covered in by the succeeding lower ones. Thus,

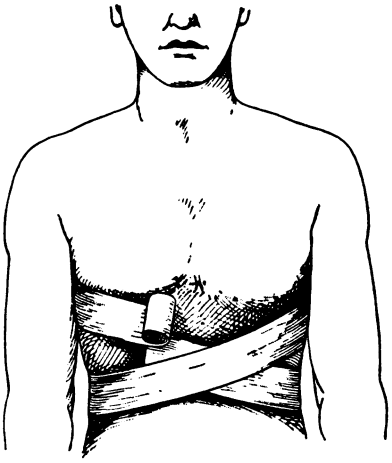


FIG. 75.—FIGURE 8 BANDAGE OF THE CHEST, COMMENCEMENT.

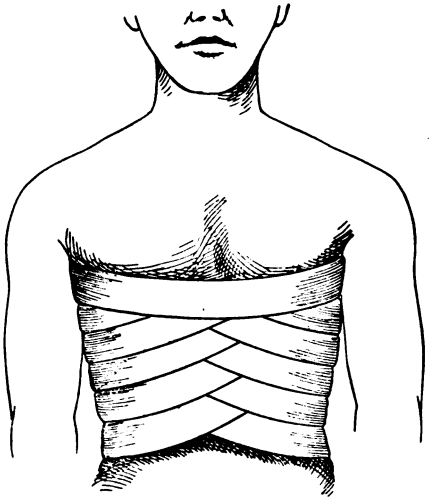


FIG. 76.—FIGURE 8 BANDAGE OF THE CHEST, COMPLETED.

when the bandage is completed, the lower loops are the only ones visible.

This is a quite secure roller bandage of the chest. A possible objection may be the amount of bandage it consumes.

Anterior Figure 8 of the Chest and Shoulders (Fig. 77).—Bandage, 6 yards × 2½ inches.

A pad having been placed beneath each arm, if necessary, to protect the axillary folds from pressure, the initial extremity is placed in the axilla and fixed by a couple of cir-

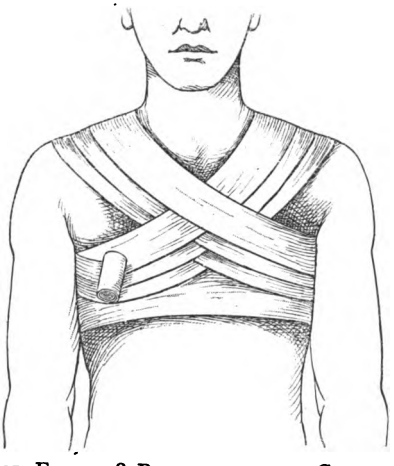


FIG. 77.—ANTERIOR FIGURE 8 BANDAGE OF THE CHEST AND SHOULDERS.

cular turns around the chest. The roller is then carried obliquely upward across the chest, over and down behind the shoulder, keeping well out toward the point, and through the axilla of the same side. From there it proceeds obliquely upward across the chest and around the opposite shoulder to the point of starting. This completes one figure 8 turn. It should be repeated twice, each turn covering in two-thirds of the preceding one and rising higher toward the neck. The turns are spread out on the shoulders, but converge toward the axillæ, as shown in figure 77.

It is often taught to commence this bandage by fixing the initial extremity around the arm, but the above method is preferable.

Posterior Figure 8 of the Chest and Shoulders.—This is similar to the anterior figure 8, described above, except that

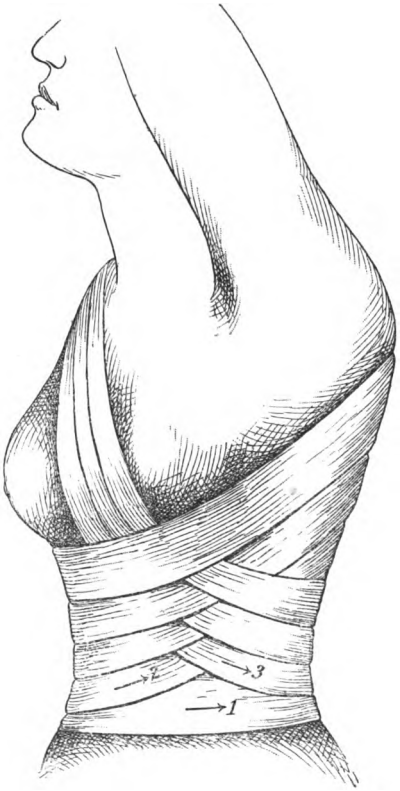


FIG. 78.—SUSPENSORY BANDAGE OF THE BREAST.

the bandage passes across the back, instead of the front of the chest. It is sometimes used in injuries to the clavicle to keep the shoulders back, but is more useful to retain dressings after the removal of tumors, etc.

Suspensory of the Breast (Fig. 78).—Bandage, 6 yards × $2\frac{1}{2}$ inches.

To bandage the left breast: Fix the initial extremity on the left side of the chest by two circular turns, carrying the bandage from left to right. On arriving beneath the breast, incline the bandage upward and carry it across the lower portion of the breast and over the opposite shoulder. From there it is brought down behind the back and again under the breast, crossing the previous turn. Continue it around the

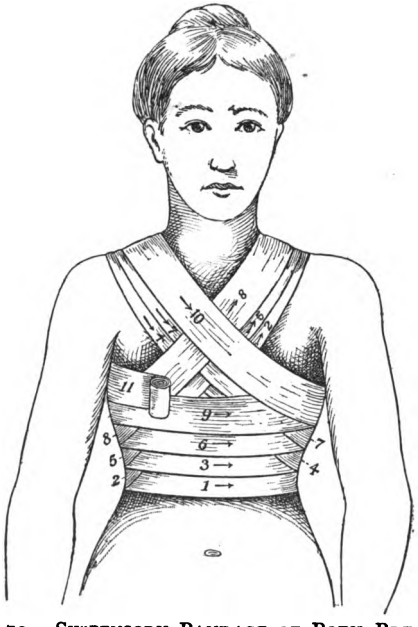


FIG. 79.—SUSPENSORY BANDAGE OF BOTH BREASTS.

body and make alternate turns over the opposite shoulder and around the body. Each turn overlaps the preceding one one-half to two-thirds of its width. The points of crossing should be made in the same vertical line under the most pendent portion of the breast. The oblique turns overlap each other more as they pass over the shoulder than when they cross under the breast. (See Fig. 78.)

This bandage is sometimes commenced, as advised by

Gerdy in 1826, by suspending the breast by a couple of turns over the opposite shoulder and then continued by alternate oblique and circular ones.

Suspensory Bandage of Both Breasts (Fig. 79).—Bandage, two rollers, each 6 yards × 2½ inches.

Place the initial extremity on the right side of the chest

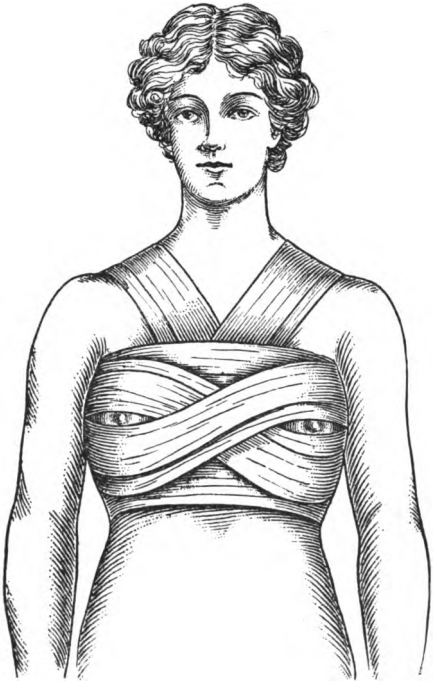


FIG. 80.—KIWISCH'S BANDAGE FOR BOTH BREASTS.

and fix by two circular turns. On arriving beneath the right breast, carry the bandage upward over the opposite shoulder, down behind the back, and forward under the right breast. It is then carried across the front of the chest, covering in one-half the circular turn, under the left breast, obliquely across the back and over the

opposite shoulder, to be brought down in front and under the left breast. From here it is carried transversely across the back, again across the right breast and over the opposite shoulder. Passing down the back and again under the right breast, it is carried directly across the front of the chest and under the left breast, to ascend the opposite shoulder as before. The two breasts are thus covered alternately until the bandage is completed, each turn covering one-half to two-thirds the preceding one. (See Fig. 79.)

Some prefer to sling each breast by one or two oblique turns, as described under the suspensory of the breast, before commencing the bandage proper.

Kiwisch's Method (Fig. 80).—(Roser, "Chirurgie," p. 252.) When it is desired to firmly compress both breasts, the bandage of Kiwisch is useful. After slinging both breasts by a couple of turns over the shoulders, he confines the breasts to the body by three or four circular turns, finishing by two or three figure 8 turns, as shown in figure 80. We have used this bandage with satisfaction in cases of chronic interstitial mammitis.

Velpeau's Bandage for Fractured Clavicle—Modified (Fig. 81).—Bandage, 8 yards × 2½ inches.

Place the arm in the Velpeau position by putting the hand of the affected side on the opposite shoulder and bringing the elbow nearly or quite opposite the point of the sternum in the median line of the body, thus pushing the affected shoulder upward, backward, and outward. Put a pad over the seat of fracture. Place the initial extremity of the bandage in the axilla of the sound side and bring the body of the bandage up behind the back, well out over the affected shoulder and down across the middle of the arm at the insertion of the deltoid muscle. Carry the bandage around underneath the arm and across the chest to the sound axilla, fastening the initial extremity. Make a second turn, cover-

ing the first exactly. On arriving beneath the arm of the affected side for the second time, the bandage should be directed horizontally around the chest. This turn is carried transversely over the point of the elbow and is then directed upward beneath the sound axilla, across the back and again over the affected shoulder, covering in *two-thirds*

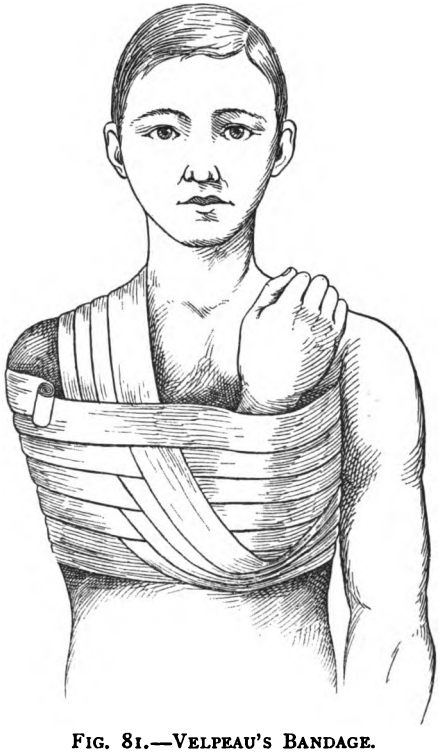


FIG. 81.—VELPEAU'S BANDAGE.

of the preceding turn. From there it goes down first in front and then beneath the arm, through the sound axilla and again transversely around the chest, covering in *one-third* of the first transverse turn. Alternate vertical and transverse turns are made, the former advancing toward the point of the elbow and covering each other two-thirds of their

width, and the latter rising on the arm and chest and covering each other one-third of their width. When the vertical turns reach the point of the elbow, the bandage is completed by two or three successive circular turns around the chest, covering the forearm of the affected side nearly up to the wrist. (See Velpeau, "Nouv. elem. de Med. Oper.," Paris, 1839.)

The turns may be secured by applying adhesive straps or sewing them together with thread. Velpeau laid on an additional bandage which had been moistened with a solution of dextrin.

In commencing the bandage, he directed as follows: "Le chef de cette bande est d'abord appliqué sous l'aisselle du coté sain, ou en arriére comme dans le cataphraste"; consequently it is sometimes taught to begin it in the axilla and sometimes (Dr. Hunter, "Int. Ency. Surgery," vol. I, p. 494) over the scapula of the sound side. The former is the more secure method.

Velpeau also completed all the vertical turns before making any transverse ones. After making three or four vertical turns, he began the transverse ones at the elbow and went up, finishing the bandage by one or two vertical turns.

It is generally preferred here to make the vertical and transverse turns alternate, until the former reach the point of the elbow, when they cease, and the bandage is finished by two or three horizontal circular turns. The first vertical turn over the shoulder is the one farthest out, the succeeding ones rising toward the neck and advancing inward on the arm to the point of the elbow.

When the patient is very square-shouldered, the vertical turns have a tendency to mass themselves together in the angle formed by the neck and the shoulder; but when the shoulders are sloping, this tendency is not seen and the turns remain on the affected shoulder as one broad band. In the former case the vertical turns have a fan-shaped appearance as they descend from the shoulder and spread out on the arm, but in the latter they are all parallel. This appearance is caused by the peculiarities of the patient, and not by any special mode of application of the bandage.

Desault's Bandage for Fractured Clavicle—Modified (Fig. 82).—Two rollers, 7 yards × 2½ inches.

A pad having been placed in the axilla of the affected side, the arm is placed parallel with the body and the forearm flexed at a right angle. The initial extremity is placed in the

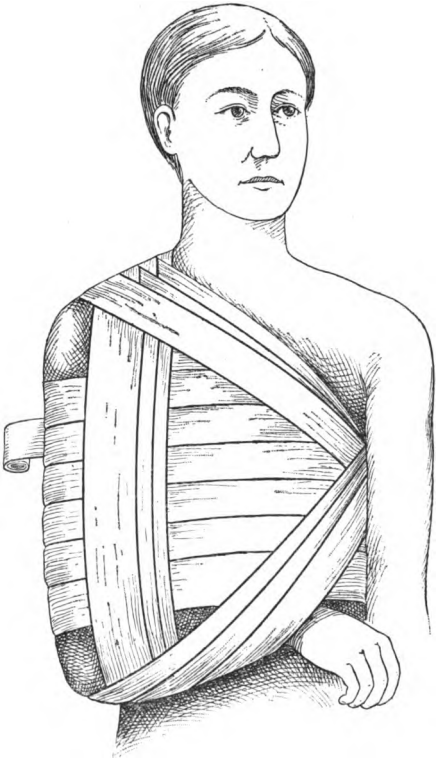


FIG. 82.—DESAULT'S BANDAGE.

axilla of the sound side and fixed by a circular turn. The arm is then bound to the side by successive descending slow spiral turns, covering each other half their width and reaching from near the shoulder to the elbow.

The initial extremity of another roller is then placed

in the sound axilla and the bandage carried behind the chest, over the affected shoulder, down in front of the arm, under the elbow, and back again to the sound axilla. A similar turn is then made on the front of the chest, the bandage being carried from the axilla across to and over the opposite shoulder, down behind the arm, under the elbow, and back again to the axilla. In going both behind and in front of the chest, the bandage always proceeds as follows, viz.: From axilla to shoulder and then to elbow, and back to axilla, forming the letters A S E. These turns are repeated once or twice, each succeeding turn covering in two-thirds of the preceding one, and the bandage finished by a few circular turns. The hand is then suspended from the neck by a sling.

Desault ("Œuvres Chirurgicales," par Xav. Bichat) used a pad three fingers' breadth in thickness, reaching from the armpit to the elbow. His bandage was composed of three rollers: The first roller was used to retain the pad to the side of the chest. The second passed circularly around the chest, from the shoulder to the elbow, confining the arm to the side. The third roller started in the sound axilla and made alternate loops in front of and behind the chest, encircling the arm of the affected side and crossing in the opposite axilla. He made the first turn *in front* of the chest, but as this has a tendency to draw the shoulder in and increase the overlapping of the fragments, it is better to make the posterior turn first, as directed above. These axilla-shoulder-elbow turns did not cover each other exactly, but, as he says, only "en partie," and the bandage ended by a few horizontal circular turns. He suspended the hand by a short broad bandage, pinned to the turns on the front of the chest. As this bandage, in its original form, has been found to be too complicated, it is usually used in the simplified form given above.

Many other turns have been described for dressing fractures of the clavicle, but they are too numerous to mention in detail.

Thivet placed the hand in either the Velpeau or the Desault position, and, having bound the arm to the side with circular turns, passed the bandage from beneath the elbow of the affected side over the sound shoulder.

Gerdy ("Traité des Bandages," 1826) put the arm in the Desault position and brought his turns not only over the

FIG. 83.—BANDAGE FOR CONFINING THE ARM TO THE SIDE.

sound shoulder as did Thivet, but also from the axilla of the sound side over the injured shoulder, down behind the arm, under the elbow, up again over the injured shoulder to the sound axilla.

Dr. Chas. W. Dulles ("Medical News") placed the hand in a modified Velpeau position and then made figure 8 loops, resembling those of Gerdy, crossing on the affected shoulder,

one loop passing through the sound axilla and the other beneath the elbow of the affected side. These alternated with transverse turns around the chest. This bandage is figured and commended favorably by A. Hoffa in his "Verbandlehre," page 34.

Hopkins ("The Roller Bandage") suggested placing the arm in the Desault position and carrying the bandage from the sound axilla over the injured shoulder, down behind the arm, under the elbow, thence over the sound shoulder, across the back, under the elbow, over the injured shoulder, and across the back, to end in the sound axilla.

To Confine the Arm to the Side.—*Author.* (Fig. 83.) Fix the initial extremity by a couple of turns around the chest and arm just above the elbow. Then bring the roller under the forearm obliquely up over the elbow (turn 1, Fig. 82), across the back, down over the elbow again (turn 2), around the back and up over the forearm (turn 3), in front of and parallel with turn 1; thence across the back and down over the forearm near the hand (turn 4), thence around the back and across the front of the chest and arm (turns 5 and 6), there ending the bandage.

PART II.

THE TAILED BANDAGES.

The tailed bandages are so called because they consist of a strip or strips of material (gauze or muslin), so fastened together or divided as to possess three or more extremities or tails. When these strips are fastened at right angles to one another in the shape of the letter T, they are called T *bandages.*

When there is only one transverse and one upright part, it is called a *single* T bandage; but when there are two upright pieces, it is called a *double* T bandage. When a single broad piece of bandage is torn from the ends nearly to the center, it sometimes receives the name of *sling.*

The ends are called tails and the part in the center remaining untorn is called the body.

In applying them, the body is first placed over the affected part and then the tails carried around the opposite side and fastened.

The tailed bandages can be multiplied indefinitely, and, with the exercise of a little ingenuity, can be applied to all parts of the body. Sufficient examples are given to show the manner of their construction and the principles of application. In many cases they are to be preferred to the roller bandage, particularly when the patient is confined to bed or the dressings require frequent changes. They are not, however, suitable for making pressure.

TAILED BANDAGES OF THE HEAD.

The Four-tailed Bandage of the Head (Figs. 84, 85, and 86). —A piece of material eight inches wide and long enough to go over the scalp and tie under the chin is torn from each extremity to within three or four inches of the middle. The

FIG. 84.

FIG. 85.

FIG. 86.

FIGS. 84, 85, AND 86.—FOUR-TAILED BANDAGE OF THE HEAD.

body of the bandage being placed on the top of the head, the two posterior tails are tied under the chin and the two anterior ones around the back of the neck (Fig. 84). If it is desired to cover the back of the head, as in figure 85, the

body is placed farther back; the two posterior tails are then fastened around the forehead and the two anterior ones down under the jaw. If it is desired to cover the front of the head, the body of the bandage is placed at this point and the two anterior tails fastened at the back of the head and the two posterior ones down under the jaw (Fig. 86).

The Six-tailed Bandage of Galen.—The "poor man's bandage" (Fig. 87). A piece of material is taken long enough to pass over the head and tie under the chin, and wide enough to reach from the root of the nose in front to the nape of the neck behind. It is then torn lengthwise so as to form six

FIG. 87.—SIX-TAILED BANDAGE OF GALEN.

FIG. 88.—FOUR-TAILED SLING OF THE CHIN.

tails, three at each end, the two middle ones being broader than those at the sides. In applying it, the body is placed on the head and the two broad tails brought down and tied under the chin. The two posterior tails are then brought forward and the two anterior tails carried backward around the head and fastened.

This is an excellent dressing when it is desired to cover the entire scalp, and may advantageously replace the recurrent bandages.

The Four-tailed Sling of the Chin (Fig. 88).—Place the body of the bandage on the point of the chin. The two

upper tails are then to be fastened around the back of the neck, while the two lower ones are carried up and tied on the top of the head. A piece of bandage or two of the tails should connect the turn at the back of the neck with that on the top of the head, as seen in figure 88. This prevents the latter from slipping forward and thus becoming displaced. Instead of fastening the lower tails at the back of the neck, they may be crossed at this point and continued forward around the forehead and pinned there, but this does not make so secure a bandage as the former method.

The Four-tailed Sling of the Neck (Fig. 89).—Place the

FIG. 89.—FOUR-TAILED SLING OF THE NECK.

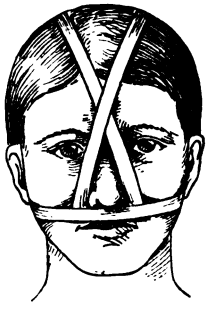


FIG. 90.—DOUBLE T BANDAGE OF THE NOSE.

body of the bandage on the back of the neck and fasten the two upper tails around the forehead and the two lower ones around the neck, as shown in figure 89.

The Double T Bandage of the Nose (Fig. 90).—A dressing having been applied over the nose, the horizontal branch of the bandage is carried around the upper lip and tied at the back of the neck. The two vertical portions are then carried upward, crossed at the root of the nose, and fastened to the horizontal turn at the back of the neck. (See Fig. 90.)

The T Bandage of the Ear (Fig. 91).—The horizontal branch is fastened around the head just above the ears and

the vertical one carried under the jaw to be fastened to the horizontal branch on the opposite side. The vertical branch may be made wider at its point of attachment to the horizontal one if so desired, as shown in figure 91. This will make it more suitable for retaining dressings over the ear or

FIG. 91.—T BANDAGE OF THE EAR.

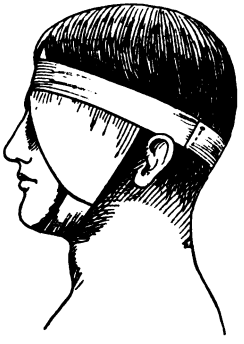


FIG. 92.

FIG. 93.

FIGS. 92 AND 93.—T BANDAGE OF THE EYE.

parotid region. If thought advisable, a slit may be made to allow the ear to project through, thus avoiding pressure being made upon it.

The T Bandage of the Eye (Figs. 92 and 93).—A small triangular piece sufficiently large to cover the eye is sewn to the horizontal branch and the vertical strip is attached to its

lower corner. The horizontal branch being fastened around the head, the vertical one is either carried around under the jaw and fastened on the opposite side, as shown in figure 92, or else taken around to the back of the head and fastened there, as shown in figure 93.

THE TAILED BANDAGES OF THE TRUNK.

The Double T Bandage of the Chest (Fig. 94).—A piece of material about eight inches wide and long enough to go one and a half times around the chest is obtained, and to its upper edge, near its middle, two strips, two inches wide by

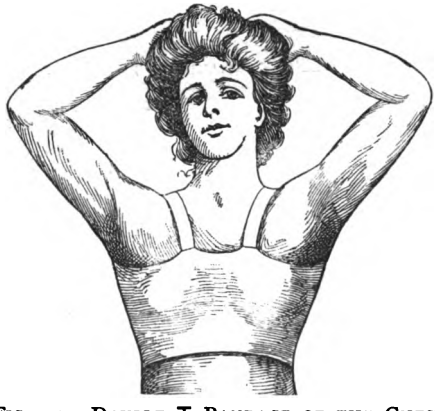


FIG. 94.—DOUBLE T BANDAGE OF THE CHEST.

about fourteen long, are attached. These strips are placed six to eight inches apart.

This bandage can be used either to retain dressings on the chest or to support the breasts.

If used for the former purpose the middle of the bandage should be placed on the back and the ends overlapped and secured in front. The two vertical strips are then brought over the shoulders and attached to the bandage on the front of the chest. These prevent it from becoming displaced by

slipping down. If it is desired to support the breasts, then the middle of the bandage should be placed on the front of the chest as shown in figure 94, and the extremities fastened on the back. Slits may be cut for the nipples and the two vertical pieces passed over the shoulder and fastened on the back.

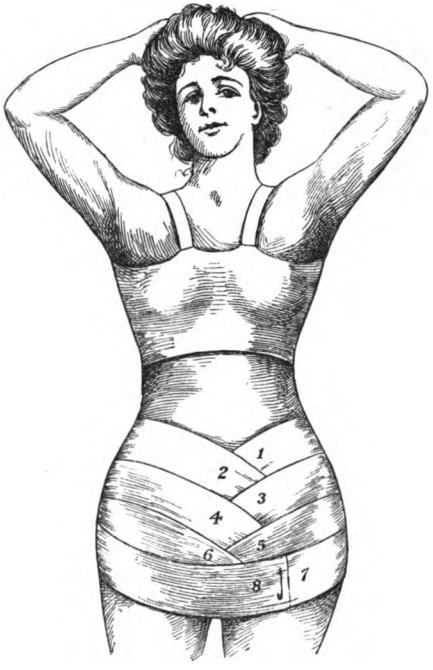


FIG. 95.—EIGHT-TAILED BANDAGE OF THE ABDOMEN.

The Double T Bandage of the Abdomen.—This is similar to the double T of the chest, the ends being fastened in front and the two vertical strips passed from behind forward between the thighs and fastened to the lower edge of the horizontal part. The vertical strips are sometimes omitted. The bandage is then known as the *binder*.

The Eight-tailed Bandage of the Abdomen (Fig. 95).—A piece of flannel is needed long enough to go one and

a half times around the body and wide enough to reach from the lower ribs to below the top of the thigh-bone. Each end is then divided for one-third the length of the bandage into four tails, leaving the middle third intact. In applying it, the body of the bandage is placed behind and the tails overlapped alternately in front, from above downward, in the order shown in figure 95, the last tail being secured by a safety pin and additional ones being inserted for security.

As this bandage has sometimes a tendency, particularly

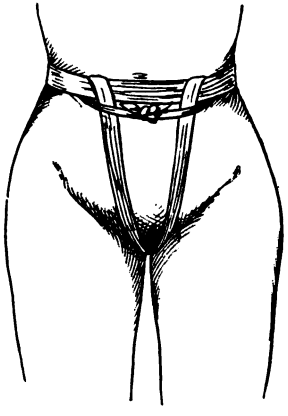


FIG. 96.—DOUBLE T BANDAGE OF THE PERINEUM.

in fat people, and if the tails are torn too near to the middle of the bandage, to mass itself together into a cord above the crest of the ilium, the plain binder or double T bandage described above is sometimes preferred to it.

The Double T Bandage of the Perineum (Fig. 96).—The horizontal arm is to be long enough to allow of its being tied around the abdomen just above the iliac crests. The vertical arm should reach from the top of the sacrum behind down under the perineum and up to the umbilicus in front. This part is torn into two tails to within six or eight inches

of the opposite extremity. It is to be attached by its undivided extremity to the middle of the horizontal strip. The horizontal arm having been fastened around the abdomen just above the iliac crests, the two vertical tails are brought under the perineum up on either side of the genitals and fastened to the horizontal arm around the abdomen. This is an effective and useful bandage in retaining dressings to the perineum, as in cases of fistulæ, etc.

If it is desired to use this bandage after operations on the scrotum or neighboring tissues, the vertical branch should

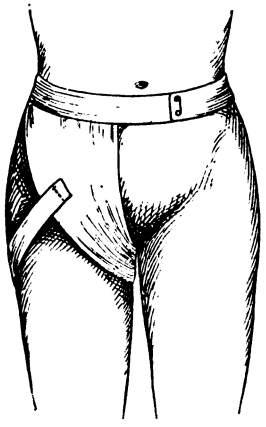


FIG. 97.—T BANDAGE OF THE GROIN.

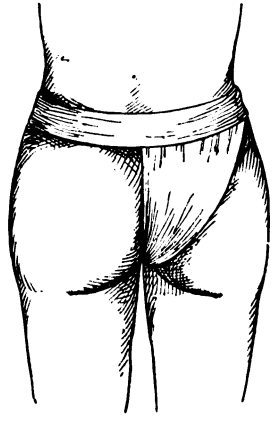


FIG. 98.—T BANDAGE OF THE BUTTOCK.

be increased in width to six or eight inches, and enough left undivided to reach from the horizontal branch above to the perineal center below. The body of the bandage is placed in front, and the two ends of the horizontal branch fastened behind. The vertical one is then carried down, passed between the thighs, and the two ends fastened to the horizontal branch behind or at the sides. An opening is made in front for the penis.

The T Bandage of the Groin (Fig. 97).—The horizontal arm should be long enough to fasten conveniently around

the abdomen. To this is sewn, by its base, a triangle ten inches long and eight inches broad. To the apex, a strip long enough to go around the thigh is attached. The horizontal arm being fastened around the abdomen just above the iliac crests, the vertical arm is passed between the thighs, carried around the outside, and fastened in front, as shown in figure 97.

The T Bandage of the Buttock (Fig. 98).—This is similar to that of the groin, except that the triangular portion is made slightly larger and is applied over the buttock instead of the groin. It is shown in figure 98.

These two bandages are sometimes very useful, as they can be made quite secure and permit of ready access to the parts beneath, more so than the roller bandages.

THE TAILED BANDAGES OF THE EXTREMITIES.

The Four-tailed Sling of the Shoulder (Fig. 99).—A square piece of material large enough to cover the shoulder should have attached to its corners two long and two short tails. The body of the bandage being applied over the shoulder, the two short tails are tied around the arm and the two long tails in the opposite axilla, as shown in figure 99. By untying the upper tails and turning down the bandage, the dressing beneath is easily accessible.

The Four-tailed Sling of the Axilla (Fig. 99).—A square or rectangular piece of muslin, large enough to contain the application, has attached to its corners four tails. The body of the bandage being placed in the axilla, the two lower tails are tied around the chest and the two upper ones crossed on the shoulder of the same side and fastened in the opposite axilla. (See Fig. 99.)

The Four-tailed Sling of the Arm (Fig. 100).—A piece of muslin ten or twelve inches wide and nearly two yards long

is torn from each end to within four inches of its middle. A slit is made in the center to receive the point of the elbow. The body of the bandage being placed beneath the elbow, the two lower tails are fastened over the opposite shoulder, preferably by safety pins, and the two upper tails fastened around the chest. (See Fig. 100.)

The Perforated T Bandage of the Hand (Figs. 101 and 102). —A piece of muslin is needed as wide as the palm of the hand and long enough to reach from the wrist to the web of the fingers and back again to the wrist. Transversely across

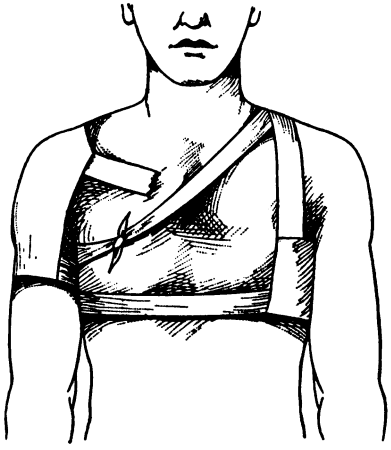


FIG. 99.—FOUR-TAILED SLINGS OF THE SHOULDER AND OF THE AXILLA.

the middle of this piece, four holes are made for the insertion of the fingers. At the corners of one end two strips are attached long enough to allow of their being secured around the wrist. The prepared bandage is shown in figure 101. It is used to retain applications to the back or palm of the hand. If desired to apply one to the dorsum, the fingers are thrust through the holes and the two tails fastened around the wrist as seen in figure 102; the remaining portion is then brought up and pinned to the strips around the wrist.

If used to retain a dressing to the palm, then the part of the bandage with the tails attached is placed on the back of the hand and the loose portion brought over the dressing

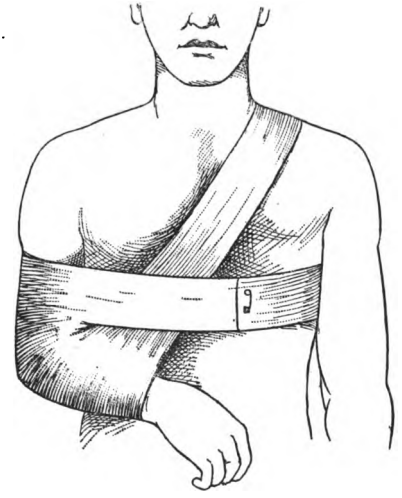


FIG. 100.—FOUR-TAILED SLING OF THE ARM.

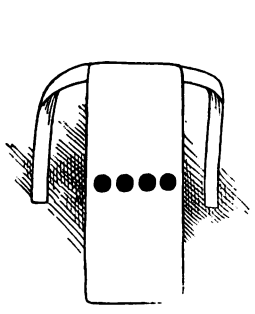


FIG. 101.

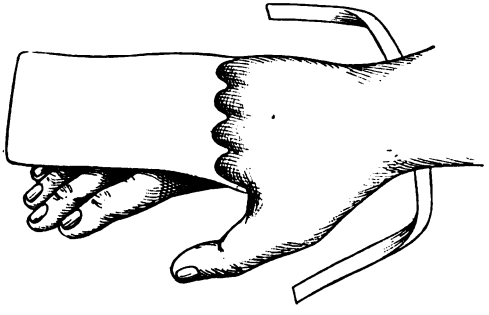


FIG. 102.

FIGS. 101 AND 102.—PERFORATED T BANDAGE OF THE HAND.

on the palm and fastened at the wrist. If so preferred, this part of the bandage may be made long enough to allow of its being secured by the tails around the wrist instead of pinning.

The Four-tailed Sling of the Knee (Fig. 103).—A square piece of muslin large enough to cover the knee or the popliteal space has attached to its corners four tails. In applying it, the body of the bandage is placed over or under the knee as desired, and the two upper tails fastened around the thigh and the two lower ones around the leg just below the patella. (See Fig. 103.)

The Many-tailed Bandage of Scultetus (Fig. 104).—A number of strips of bandage are made two or more inches in width and long enough to reach one and a half times around the leg. On account of its circumference increasing from the ankle upward, the strips should be made proportionally longer as the limb is ascended. The number of strips to be employed varies according to their width and the extent of the limb to be covered. If narrow strips are used and the whole leg is to be enveloped, twelve may be required; but if

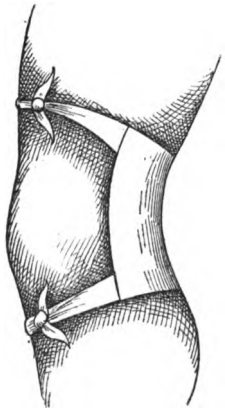


FIG. 103.—FOUR-TAILED SLING OF THE KNEE.

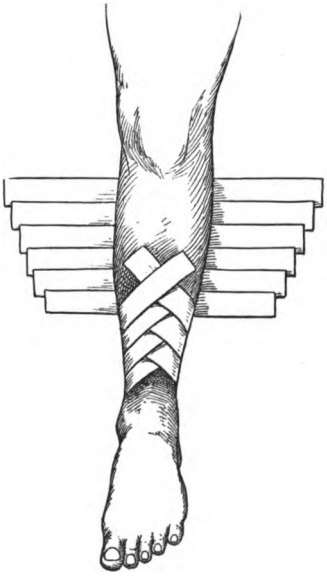


FIG. 104.—MANY-TAILED BANDAGE OF SCULTETUS.

the width of the strips is increased to three or four inches and the leg is only to be partially covered, three, four, or five may be sufficient.

The size and number of the strips having been decided on, they are laid transversely on a towel, or pillow, or board, the top strip being laid first and each successive one covering the preceding piece one-third of its width. The limb is then raised from the bed, and the cloth or pillow on which the strips are lying is slid beneath it. (See Fig. 104.) Another method is to roll the bandage from each side toward the center, and then grasping a roll in each hand, to place it beneath the limb. If so desired, the strips on each side of the leg may be moistened with a sponge dipped in an evaporating lotion. Beginning with the lowest, the two ends of each strip are then brought forward and crossed on the front of the leg (see the figure), the last being fastened by pinning, or, as preferred by Dr. Geo. W. Norris, tied.

This bandage allows the parts to be inspected without moving the limb. If any of the strips become soiled they can be readily replaced with clean ones by pinning the clean to the soiled strips and then pulling them through. Percival Pott attached the strips together by sewing them down the middle. This necessitates the removal of the whole bandage if it is desired to replace a soiled strip. This bandage forms a good means of retaining dressings in injuries of the leg when the fracture box is used, as its adjustment involves no disturbance of the member.

PART III.

THE HANDKERCHIEF BANDAGES.

Handkerchief bandages are those made of handkerchiefs or other material in the form of a square. They have been in use for centuries, but in 1832, Mayor, a surgeon of Lausanne, Switzerland, published a work entitled "Un nouveau systéme de deligation chirurgicale." In this work he added many new bandages to those already existing, classified and named them, and advocated their use for all parts of the body. He enlarged and systematized the subject so well that he has been regarded as the originator of a new system of surgical dressings, and it is spoken of as Mayor's system of handkerchief dressings.

In many cases these dressings are far superior to the roller bandages, particularly where support rather than pressure is desired, as in the handkerchiefs for the arm. Sometimes they can be well applied to places that it is very difficult to cover satisfactorily with a roller bandage, as the gluteal region.

When an application has been made to a part that requires frequent attention, the handkerchief bandage allows ready access to it; thus, in contusions of the shoulder in which it is desired to apply an evaporating lotion, the triangular cap retains the dressing well, and at the same time, by freeing and turning down the point of the triangle, the dressing can at once be inspected.

They are also useful as provisional dressings in war and cases of accident. The roller bandage is sometimes impossible to obtain, while the handkerchief is found everywhere, and a person possessing some knowledge of the subject can, with the exercise of a little ingenuity, adapt them to almost any form of injury.

Materials.—Handkerchief bandages are made with cotton,

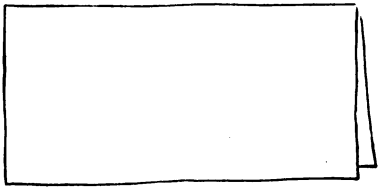


FIG. 105.—RECTANGLE OR OBLONG.

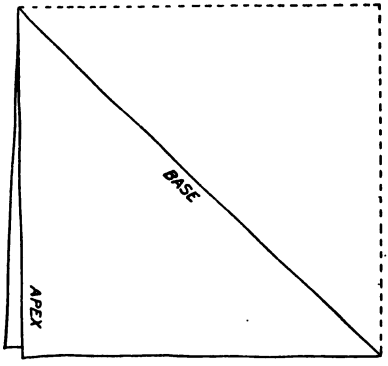


FIG. 106.—TRIANGLE.

linen, or silk squares, of various sizes, according to the parts to be covered.

The material used should be thin and pliable. If unbleached muslin is employed, it should be the thinnest obtainable. Cheese-cloth often makes an excellent handkerchief, particularly when a large one is desired. Large linen or silk handkerchiefs are also good. The handkerchief is

rarely employed in the form of a square, but is folded into various shapes, according to the use to which it is to be put.

When folded across its middle from side to side, it forms a *rectangle* or *oblong*, as seen in figure 105.

FIG. 107.—CRAVAT.

FIG. 108.—REEF KNOT.

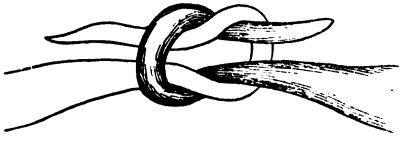


FIG. 109.—REEF KNOT.

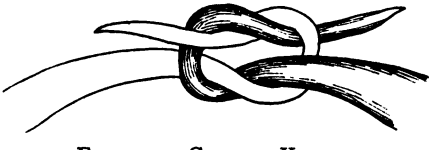


FIG. 110.—GRANNY KNOT.

When folded diagonally across from corner to corner, as seen in figure 106, it forms the *triangle*.

The longest side of the triangle is its *base*.

The angles at each end of the base are called the *extremities* or *ends* of the triangle, and the angle opposite to the base is called its *apex* or *point*.

When a triangle is loosely rolled together or folded from

side to side repeatedly, the apex being laid toward the base, it forms the *cravat.* (See Fig. 107.)

A twisted cravat is called a *cord.* It is rarely used.

In naming the handkerchief bandages, the first portion of the name was intended to designate the part of the body to which the base of the handkerchief was to be applied, but this has not been carried out in all cases. The ends of a handkerchief may be fastened either by pinning or knotting. If pinned, a safety pin is the best to use. If knotted, a reef knot, as shown in figures 108 and 109, is the one to be employed, and not the Granny knot, as shown in figure 110; the latter is insecure and liable to slip. To avoid discomfort it should, when possible, not be made on a prominent bony part, and the parts beneath should be guarded by a wad of cotton.

THE SPECIAL HANDKERCHIEF BANDAGES.

Beginning at the Head and Proceeding Downward.

1. Handkerchief Bandages for the Head.

The Occipito-frontal Triangle (Fig. 111).—Place the base of the triangle on the nape of the neck and bring the apex forward over the head, allowing it to hang down in front. Knot the extremities around the forehead, as seen in figure 111, and turn the apex up and pin it.

The Fronto-occipital Triangle (Fig. 112).—Place the base on the forehead and allow the apex to hang down the back of the neck. Tie the extremities just below the occipital protuberance and bring the apex up and pin it, as seen in figure 112.

On account of the knot being behind, it is apt to cause some inconvenience if the bandage is worn in bed. Under these circumstances the former bandage is more suitable.

The Bi-temporal Triangle (Fig. 113).—Place the base of the triangle on the side of the head just above one ear and allow the apex to hang down over the other ear. Carry the extremities around and knot them over the apex of the tri-

FIG. 111.—OCCIPITO-FRONTAL TRIANGLE.

FIG. 112.—FRONTO-OCCIPITAL TRIANGLE.

FIG. 113.—BI-TEMPORAL TRIANGLE.

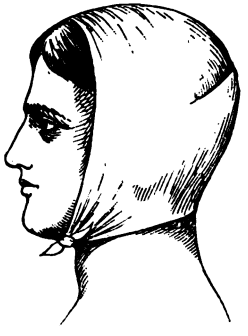


FIG. 114.—VERTICO-MENTAL TRIANGLE.

angle on the opposite side of the head. The apex should then be turned up and pinned, as shown in figure 113.

The Vertico-mental Triangle (Fig. 114).—Place the base of the triangle on the top of the head, the apex being backward, and knot the two extremities under the chin. The apex is then brought around to one side and pinned. (See Fig. 114.)

The Auriculo-occipital Triangle (Fig. 115).—Place the base of the triangle on the side of the face in front of the ear, the apex pointing backward. Carry the extremities to the opposite side and fasten them by pinning. Fold the apex around the back of the head and pin it to the extremities in front of the ear, as seen in figure 115.

The Fronto-occipito-labialis Cravat (Fig. 116).—Place the body of the cravat on the forehead and carry the extremities around the back of the head, to be brought forward and crossed on the upper lip, where they are to be pinned as seen in figure 116.

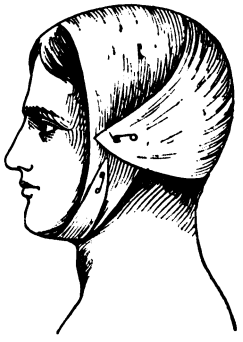


FIG. 115.—AURICULO-OCCIPITAL TRIANGLE.

FIG. 116.—FRONTO-OCCIPITO-LABIALIS CRAVAT.

It may be used to retain dressings to the upper lip. Mayor also made a triangle of the same name, using the handkerchief folded in the form of a triangle instead of a cravat.

The Square Cap of the Head (Figs. 117 and 118).—A handkerchief should be used possessing a side long enough to go over the top of the head and allow its corners to be easily tied under the chin. It is then folded across its middle and one side brought to within an inch or two of the opposite one. Place it transversely on the head, the folded edge being behind and the middle of the handkerchief being in the median line. The longer of the two sides should be next the

scalp and the edge of the shorter side passing across the forehead. The four corners are allowed to hang down on the shoulders, two on each side. This arrangement is seen in figure 117. The two outer corners are then grasped and tied under the chin. The two inner corners are to be pulled out until the posterior edge and sides of the handkerchief lie as neatly and closely around the back of the neck as possible. This having been done, the edge which projects over the forehead is folded backward and the ends are twisted and tied

FIG. 117.

FIG. 118.

FIGS. 117 AND 118.—THE SQUARE CAP OF THE HEAD.

or pinned together at the back of the neck and all the folds neatly adjusted. The completed dressing is shown in figure 118.

This dressing was used by the ancient surgeons in cases of trephining, but it is now displaced by less cumbersome ones. It is commonly made with a much larger handkerchief than the one here advised, the under portion of the bandage being allowed to hang down to the end of the nose and the upper to the eyebrows. When made in this manner, the portion of the handkerchief remaining projecting at the sides of the neck was turned up and pinned on either side of the head.

The two ends which are fastened around the back of the neck are called, from their spreading form, "goose feet."

The Triangular or Hunter's Cap of the Head (Figs. 119 and 120).—This requires a handkerchief with a side long enough to pass over the head and fasten under the chin. It is first folded transversely across the middle until one side is within an inch of the opposite one. It is then turned over, the shorter side being placed underneath. Turn the two corners of the folded edge inward, forming a triangle, as seen in figure 119. The two extremities of this triangle should be taken in either hand, and while kept tense, twisted and rolled up to the extent of almost two inches. On lifting the handkerchief, the hands should be approached slightly to each other, thus causing the two sides to separate. It is then turned around and placed on the head, the thin edge coming down over the forehead and the rolled or thick edge going down around the back of the neck. Tie the two ends together under the chin and the bandage is completed, as seen in figure 120.

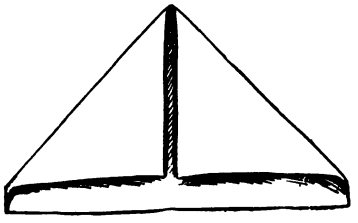


FIG. 119.

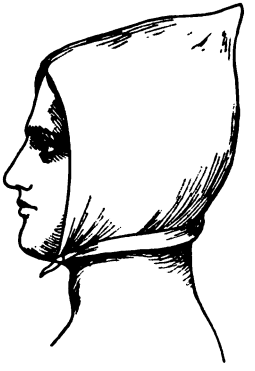


FIG. 120.

FIGS. 119 AND 120.—THE TRIANGULAR CAP OF THE HEAD.

This bandage is said to be used by the hunters in the Adirondack Mountains to protect themselves from the bites of insects. It requires less material than the square cap of the head and is less heating.

2. HANDKERCHIEFS FOR THE HEAD AND TRUNK.

The Occipito-sternal Triangle (Fig. 121).—A cravat is first to be fastened around the body just below the arms. The body of a triangle is then placed on the back of the head and the two extremities brought forward and fastened to the

FIG. 121.—OCCIPITO-STERNAL TRIANGLE.

cravat around the body. The apex is then to be brought around to one side of the head and pinned, as seen in figure 121.

It is designed to keep the head flexed on the body in cases of wounds of the neck, as cut throat, etc.

The Parieto-axillaris Triangle (Fig. 122).—If it is desired to incline the head to one side instead of forward, then the cravat should be placed around one shoulder and the body of the triangle over the parietal region of the opposite side of

FIG. 122.—PARIETO-AXILLARIS TRIANGLE.

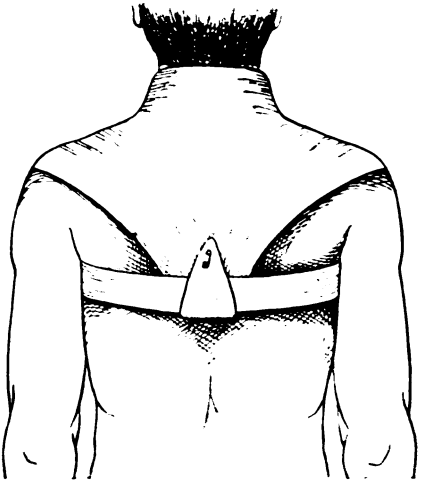


FIG. 123.—DORSO-BIS-AXILLARY TRIANGLE OR BREAKFAST SHAWL.

the head. The extremities are then fastened to the cravat around the shoulder and the head drawn over as seen in figure 122.

3. Handkerchiefs for the Chest.

The Dorso-bis-axillary Triangle.—(*The Breakfast Shawl, or Cervico-dorso-sternal Triangle of Mayor*, Fig. 123.) Fasten a cravat around the body beneath the arms. The base of a

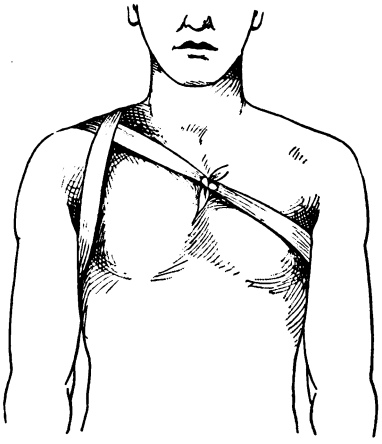


Fig. 124.—Bis-axillary Cravat.

large triangle is then placed on the nape of the neck, the two extremities being brought down in front of the chest and fastened to the cravat around the body. The apex of the triangle is passed under the cravat on the back and pinned. (See Fig. 123.)

It is intended to retain applications to the back.

The Simple Figure 8 Cravat of the Shoulder, or the Simple Bis-axillary Cravat (Fig. 124).—The body of the cravat being

placed in one axilla, the ends are crossed over the shoulder and tied in the opposite axilla. (See Fig. 124.)

The Compound Figure 8 Cravat of the Shoulder, or the Compound Bis-axillary Cravat (Fig. 125).—The body of a small cravat is placed in one axilla and the ends tied over the shoulder. The body of a larger cravat is then placed in the opposite axilla and its extremities carried across, one in front of and the other behind the chest. The posterior ex-

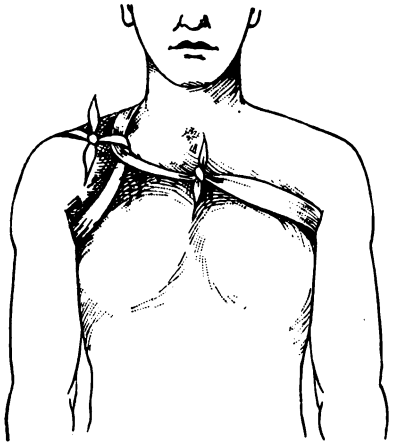


FIG. 125.—COMPOUND BIS-AXILLARY CRAVAT.

tremity should be passed through the loop on the top of the shoulder formed by the small cravat and fastened to the anterior one in front of the chest, as seen in figure 125.

Both of these cravats are well adapted to retain dressings in the axilla.

The Simple Figure 8 Cravat of the Back, or the Simple Dorso-bis-axillary Cravat.—*Mayor.* (Fig. 126.) Sometimes called the bis-axilla-scapulary cravat. The body of a long cravat is placed obliquely across the back, one extremity being carried around one shoulder from above

downward and the other around the opposite shoulder from below upward. The two ends are then brought across the back and fastened. (See Fig. 126.)

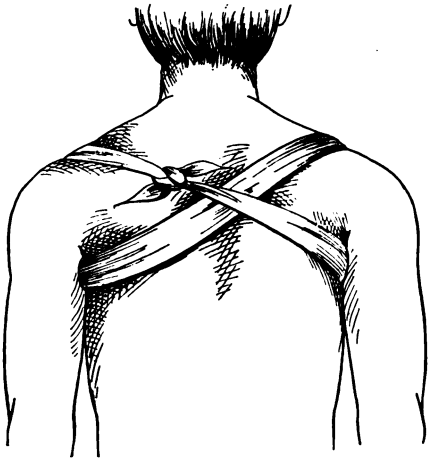


FIG. 126.—DORSO-BIS-AXILLARY CRAVAT.

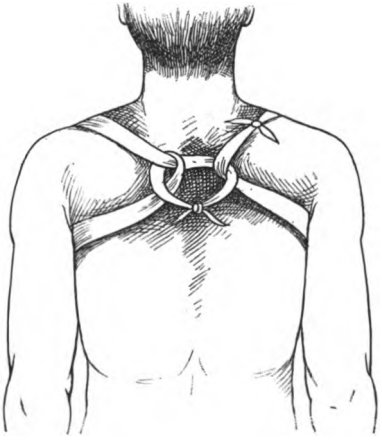


FIG. 127.—COMPOUND DORSO-BIS-AXILLARY CRAVAT.

The Compound Figure 8 Cravat of the Back, or the Compound Dorso-bis-axillary Cravat.—*Mayor.* (Fig. 127.) A short cravat is tied around one shoulder. A long cravat is

then passed around the opposite shoulder and tied in a single knot on the back. Pass one of the ends under the short cravat and fasten the two extremities, as seen in figure 127.

If it is desired to draw the shoulders back, as sometimes occurs in injuries of the clavicle, it can be well done with this bandage, as considerable force can be exerted by drawing on the two extremities of the longer cravat, previous to fastening.

The Thoracico-dorsal Triangle.—(*The Thoracico-scapulary Triangle of Mayor*, Fig. 128.) The base of a large tri-

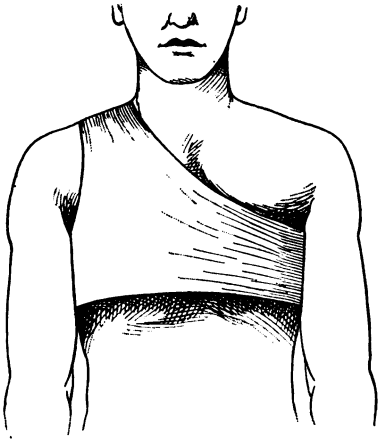


FIG. 128.—THORACICO-DORSAL TRIANGLE.

angle is placed on the front of the chest and the two extremities passed around under the arms and tied on the back. The apex is then carried over one of the shoulders and fastened to the part on the back. If the apex is not long enough to allow of its being fastened, it should be lengthened by attaching to it a cravat or piece of bandage (Fig. 128).

It is of service in retaining dressings on the front of the chest and mammary region.

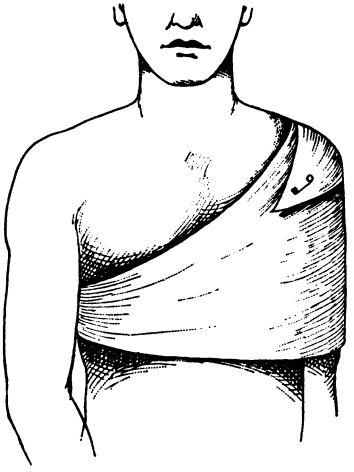


FIG. 129.—THORACICO-LATERAL TRIANGLE.

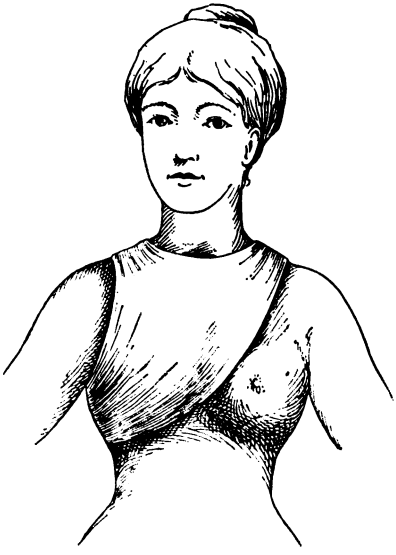


FIG. 130.—TRIANGULAR CAP OR SUSPENSORY OF THE BREAST.

The Thoracico-lateral Triangle (Fig. 129).—This bandage is intended for use in case of disarticulation at the shoulder-joint. The base of the triangle is placed on the affected side of the chest, and the extremities fastened under the opposite arm. The apex should then be carried up and folded over the affected shoulder, being pinned in front, as seen in figure 129.

The Triangular Cap, or Suspensory of the Breast (Fig. 130).—The base of a large triangle is placed under the affected breast, one end being carried beneath the axilla and the other around the opposite side of the neck, to be tied together on the back. The apex should then be brought up and passed over the shoulder of the affected side and fastened to the bandage behind. (See Fig. 130.)

This is a convenient mode of slinging the breast in nursing women or other cases where simple support is desired. It is not suitable when pressure is wanted, the roller bandage being preferable in such cases.

4. Handkerchiefs for Slinging the Arm.

The Brachio-cervical Cravat (Fig. 131).—The forearm being flexed, the body of a cravat is placed beneath the wrist and its two ends carried around the neck and fastened in front and to one side, as seen in figure 131.

The knot should never be placed on the back of the neck, and if the pressure at this point is too great, cotton or other material should be placed beneath the handkerchief to prevent the cravat irritating the neck.

The Compound Brachio-cervical Cravat.—The arm can also be supported by two cravats, a short one tied loosely around the neck, through which is tied the ends of the one supporting the arm. (See Fig. 132.)

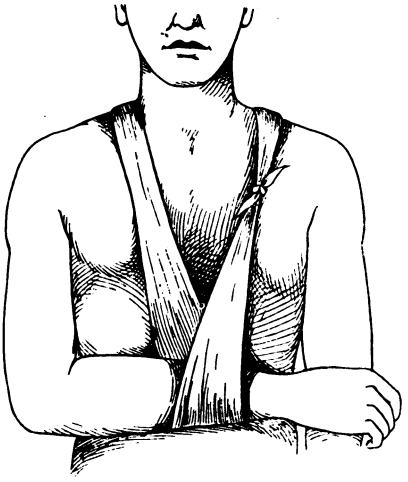


FIG. 131.—BRACHIO-CERVICAL CRAVAT.

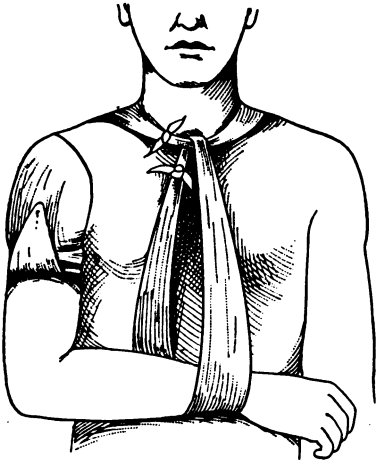


FIG. 132.—COMPOUND BRACHIO-CERVICAL CRAVAT.

The Simple Brachio-cervical Triangle (Fig. 133).—The forearm being flexed at a right angle, the base of a triangle is placed under the wrist and the two extremities tied around the neck, the knot being thrown to one side. The apex should then be brought around the elbow and pinned in front, as seen in figure 133.

In using this handkerchief for fractured clavicle, an additional cravat may be passed around the body, just above the forearm, thus confining the arm to the side.

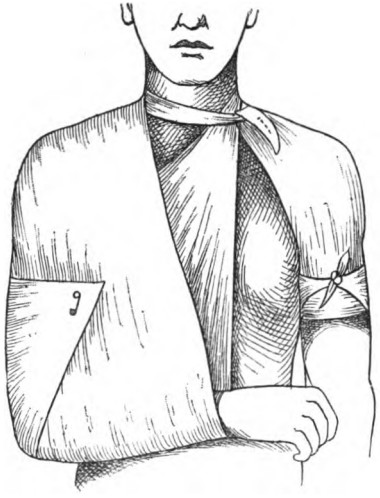


FIG. 133.—BRACHIO-CERVICAL TRIANGLE.

The Compound Brachio-cervical Triangle (Fig. 134).—A short cravat is tied loosely around the neck, the knot being placed in front. Place the base of the triangle under the wrist, the apex projecting beyond the point of the elbow. Bring the two extremities up and fasten them to the cravat around the neck. The apex should then be neatly folded around the elbow and pinned in front, as seen in figure 134.

The broad body of the cravat around the neck enables the patient to bear the pressure of the weight of the arm with less

discomfort than when the simple triangle, shown in figure 133, is used; on this account it is to be preferred.

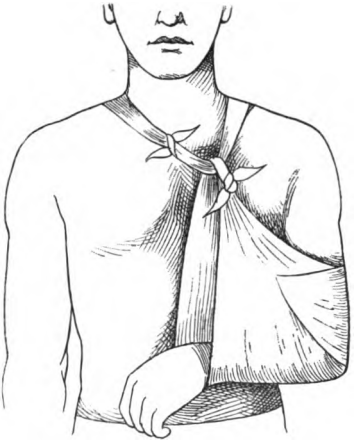


FIG. 134.—COMPOUND BRACHIO-CERVICAL TRIANGLE.

FIG. 135.—OBLIQUE TRIANGLE OF THE ARM AND CHEST—FIRST METHOD.

The Oblique Triangle of the Arm and Chest.—*First Method* (Fig. 135).—The base of the triangle is placed be-

neath the wrist, the apex projecting beyond the elbow. The extremities are then carried one in front and the other behind the chest and fastened over the opposite shoulder. Bring the apex around the arm and pin it in front, as seen in figure 135.

Second Method (Fig. 136).—Place the base of the triangle beneath the wrist, allowing the apex to project beyond the elbow. Carry the extremity which is next the chest over the opposite shoulder. Pass the extremity which is on the outer

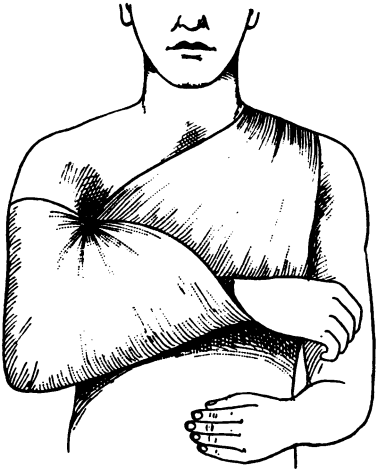


FIG. 136.—OBLIQUE TRIANGLE OF THE ARM AND CHEST—SECOND METHOD.

side of the forearm through the axilla of the injured side, and fasten it to that which was carried over the sound shoulder. The apex is then to be folded around backward and tucked in beneath the arm. (See Fig. 136.)

Triangles for the Suspension of the Arm from the Injured Side.—*First Method* (Fig. 137).—Place the base of a triangle on the front of the chest, apex downward, and carry the extremities around the body and fasten them posteriorly on the sound side. Bring the apex up in front of the arm and connect it, by means of a strip of bandage, over the shoulder

of the injured side, to the handkerchief on the back, as seen in figure 137.

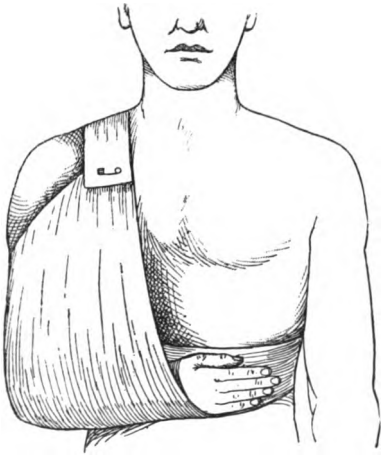


FIG. 137.—TRIANGLE FOR SUSPENSION OF THE ARM FROM THE INJURED SIDE—FIRST METHOD.

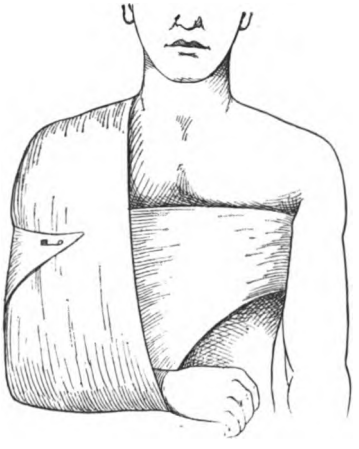


FIG. 138.

Second Method (Fig. 138).—Place the base of the triangle obliquely beneath the wrist, the apex projecting beyond the elbow. Carry the posterior extremity beneath the axilla of

the sound side and the anterior one over the shoulder of the injured side. Tie them together on the back. The apex is then brought around the arm and pinned in front. (See Fig. 138.)

Third Method (Fig. 139).—Place the base of the triangle beneath the wrist. The posterior extremity having been carried directly upward in front of the shoulder, the anterior is passed through the axilla and around the back of the

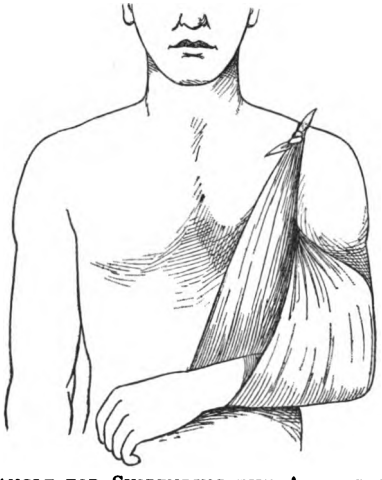


FIG. 139.—TRIANGLE FOR SUSPENDING THE ARM FROM THE INJURED SIDE—THIRD METHOD.

shoulder, to be fastened to the posterior extremity on top. The apex is tucked in under the arm (Fig. 139).

Fourth Method (Fig. 140).—In order to prevent the bandage from becoming displaced by slipping off the point of the shoulder, the following is suggested: A cravat is fastened over the shoulder of the injured side and around the opposite axilla. The base of the triangle is placed beneath the wrist, the apex projecting beyond the elbow. The anterior extremity having been carried up to the front of the shoulder, the posterior one is carried up behind the shoulder, passed beneath the cravat on top and fastened to the anterior ex-

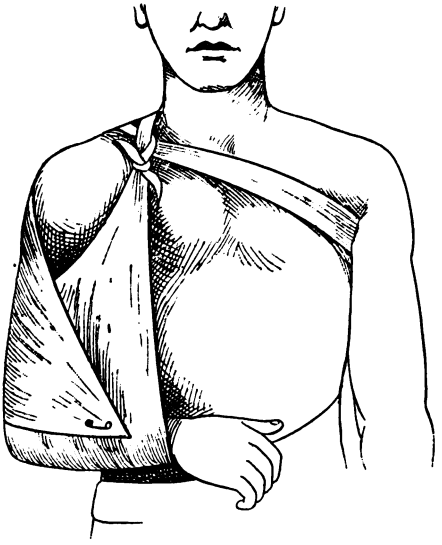


FIG. 140.—TRIANGLE FOR SUSPENDING THE ARM FROM THE INJURED SIDE—FOURTH METHOD.

FIG. 141.—MAYOR'S BANDAGE FOR FRACTURED CLAVICLE.

tremity in front, as seen in figure 140. The apex is folded around the arm and pinned in front.

Mayor's Bandage for Fractured Clavicle (Fig. 141).—The arm having been flexed at a right angle, it is confined to the side by a triangular handkerchief, the base being placed just above the forearm and the two extremities being fastened on the back. The apex is allowed to hang down in front. The two folds forming the apex are then carried up between the arm and the body, and the under one passed to the sound

FIG. 142.—GOSSELIN'S BANDAGE FOR FRACTURED CLAVICLE.

shoulder, while the upper one is carried to the affected shoulder. A broad piece of bandage is fastened to one apex and carried down beneath the handkerchief at the back to be brought up again and fastened to the other apex on the opposite shoulder, as seen in figure 141.

Gosselin's Modification of Mayor's Bandage (Fig. 142).—The base of the triangle being placed on the chest, the two extremities are tied behind the back, the two folds forming the apex being allowed to hang down in front. The first

fold is to be carried up *beneath* the arm to the affected shoulder. The second fold is brought up *over* the arm toward the sound shoulder. A broad strip of bandage is then fastened to it and carried over the sound shoulder, down beneath the handkerchief at the back and up over the affected shoulder, to be fastened to the apex of the first fold, as seen in figure 142.

This is a convenient and effective dressing to use, especially in children, after the more solid dressings have been discarded. I prefer it to Mayor's original bandage, as given above.

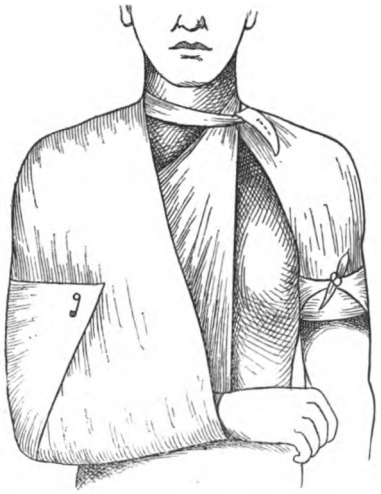


FIG. 143.—TRIANGULAR CAP OF THE SHOULDER.

5. HANDKERCHIEFS FOR THE UPPER EXTREMITY.

The Triangular Cap of the Shoulder (Fig. 143).—A cravat is tied loosely around the neck. The base of a triangle being placed on the outer side of the arm near the shoulder, its two extremities should be carried around it and tied. The apex

is then brought up over the shoulder, passed under the cravat around the neck and fastened with a pin. (See Fig. 143.)

This is a very useful bandage to retain applications on the shoulder. By unpinning the apex of the triangle the handkerchief can be turned down and the parts beneath inspected.

The Triangular Cap of the Shoulder.—*Agnew's Method* (Fig. 144). Professor Agnew ("Surgery," vol. 1, p. 713)

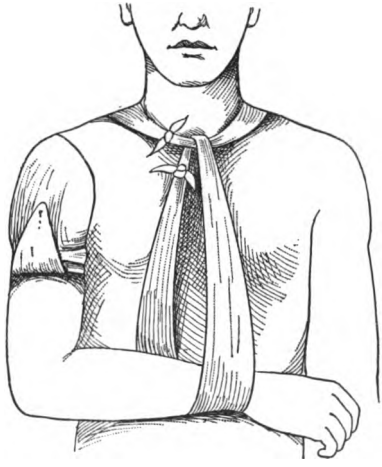


FIG. 144.—TRIANGULAR CAP OF THE SHOULDER—AGNEW'S METHOD.

prefers applying the triangular cap of the shoulder by placing the base over the top of the shoulder and carrying the extremities down under the axilla and tying them around the arm. The apex is then turned up and pinned. (See Fig. 144.)

The Palmar Triangle (Fig. 145).—The base of the triangle is placed at the wrist, and the apex folded up over the ends of the fingers. The two extremities are then carried around the hand, one on each side, and tied around the wrist as seen in figure 145.

If the apex projects at the wrist above the base of the triangle, it may either be turned down and pinned or else confined by the knot. This is a convenient bandage to retain applications to the hand, particularly in burn cases, or

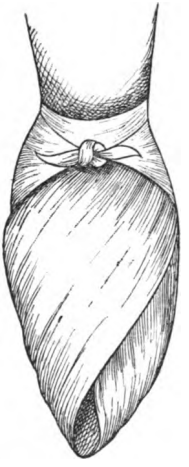


FIG. 145.—THE PALMAR TRIANGLE.

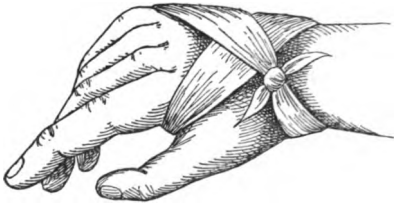


FIG. 146.—CRAVAT FOR THE HAND.

to cover a previously applied dressing to prevent its getting soiled.

The Cravat for the Hand (Fig. 146).—The body of the cravat is placed between the thumb and forefinger and its extremities carried up and fastened around the wrist. (See Fig. 146.)

The cravat can be applied in many other ways both to the

hand and various parts of the upper extremity according to the indications which it is desired to fulfil.

6. Handkerchiefs for the Pubic Region.

The Sacro-pubic Triangle.—*Mayor* (Fig. 147). Place the base of a large triangle over the sacrum and fasten its extremities around the body in front. Carry the apex down

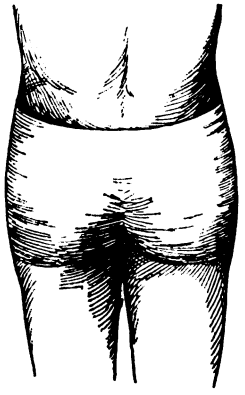


Fig. 147.—Sacro-pubic Triangle.

beneath the perineum and then up in front of the pubis and fasten it by a safety pin (Fig. 147).

A useful bandage to retain dressings to the sacrum or both buttocks.

The Scrotal Triangle.—(*Suspensory Bandage of the Scrotum*, Fig. 148.) A long cravat is first tied around the body just above the hips. The base of a triangle is then placed beneath and behind the scrotum and its two extremities brought up and passed around the cravat from above downward. They are then brought around the *outer* edges of the handkerchief and tied in front, as seen in figure 148.

Bring the apex up, carry it around the cravat from below upward, and pass it beneath the knot formed by tying the extremities of the triangle.

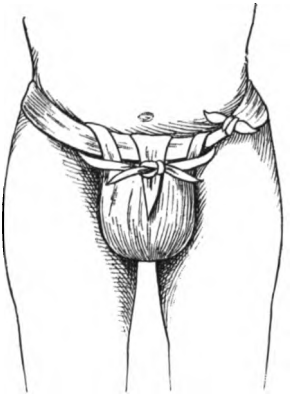


FIG. 148.—SCROTAL TRIANGLE.

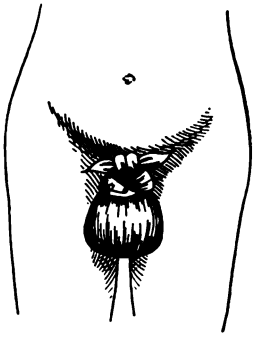


FIG. 149.—SCROTAL SQUARE.

This is a convenient dressing when the ordinary knit suspensory bandage of the shops is either unsuitable or cannot be obtained.

The Scrotal Square.—*Devised by Dr. H. Beates* (Fig. 149). Place one side of a square handkerchief beneath the scrotum and tie its two corners over the root of the penis. The remaining corners are then taken one in each hand and

twisted two or three times. Then bring them up and pass them beneath the handkerchief at the root of the penis from above downward, bringing them out at the sides and tying or pinning them in front, precisely as is shown in figure 148 of the scrotal triangle.

It is not a suspensory bandage and should not be employed when support is required. It is useful in cases of troubles affecting the penis, as any discharge which exists can be provided for and prevented from soiling the patient's clothes. It may be used in patients confined to bed.

7. Handkerchiefs for the Lower Extremity and Trunk.

The Ilio-inguinal Cravat.—(*The Cruro-pelvic Cravat of Mayor*, Fig. 150.) Place the body of a large cravat over the inguinal region. Carry the upper extremity around the body

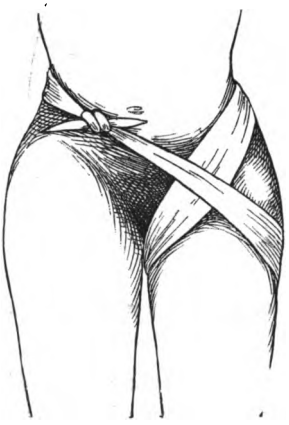


Fig. 150.—Ilio-inguinal Cravat.

and the lower extremity around the thigh, knotting the two ends in front, as seen in figure 150.

The Double Ilio-inguinal Cravat.—(*The Sacro-bi-crural*

Cravat of Mayor, Fig. 151.) Place the body of the long cravat over the upper part of the sacrum, bringing its two extremities around the body, then down in front of each groin and

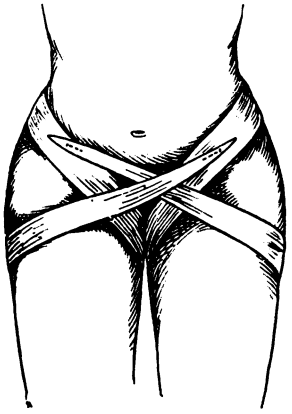


FIG. 151.—DOUBLE ILIO-INGUINAL CRAVAT.

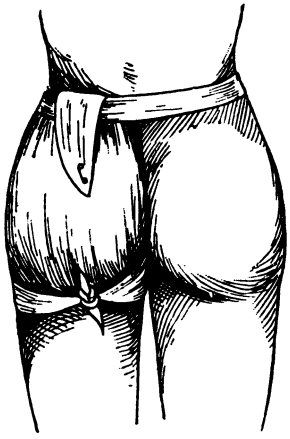


FIG. 152.—ILIO-FEMORAL TRIANGLE.

around the thighs, to be fastened on the opposite side of the body, as seen in figure 151.

These two bandages necessitate the use of such extremely long cravats that they are seldom employed.

The Ilio-femoral Triangle.—(*The Sub-femoral Triangle of Mayor, or Triangular Cap of the Buttock*, Fig. 152.) A long cravat is fastened around the waist. The base of a triangle is then placed in the gluteo-femoral fold, and its extremities fastened around the thigh. Carry the apex up and pass

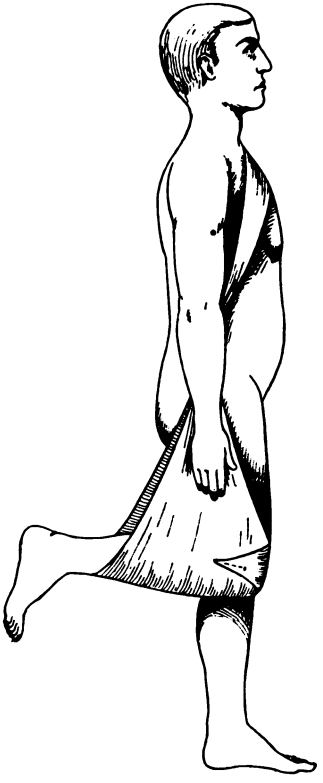


FIG. 153.—TIBIO-CERVICAL SLING.

it beneath the cravat around the waist, turning it down and pinning it to the body of the triangle. (See Fig. 152.)

A most useful bandage for retaining applications to the region of the buttock, hip, or even groin. By unpinning the apex and

turning it down, ready access can be had to the dressing beneath, without disturbing the patient.

The Tibio-cervical Sling (Fig. 153).—Place the body of a long cravat on the shoulder of the sound side, and fasten its extremities together low down on the opposite side, thus forming a sort of sash. After flexing the leg on the thigh, place the base of a triangle near the foot, allowing its apex to

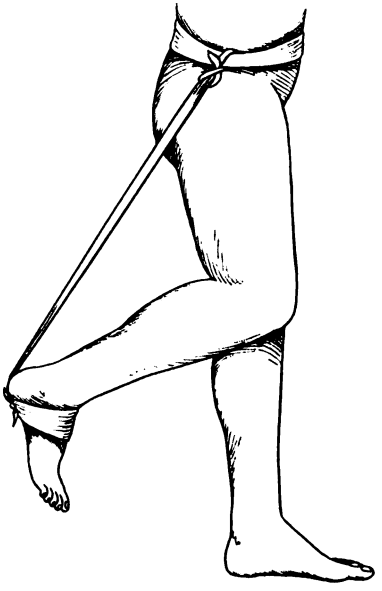


FIG. 154.—TARSO-PELVIC CRAVAT.

project beyond the point of the knee. Carry the two extremities upward, one on each side of the thigh, and tie them to the cravat above, as seen in figure 153. The apex is then folded around the knee and pinned to its outer side.

It is used to support the leg after fracture, the patient being allowed to walk about on crutches without using the injured member.

The Tarso-pelvic Cravat.—*Mayor* (Fig. 154). Tie a long

cravat around the waist and a short one around the instep, connect these two with a third cravat, as seen in figure 154, the knee being flexed nearly or quite at a right angle.

Uses the same as the tibio-cervical sling.

8. The Handkerchiefs for the Lower Extremity.

The Tarso-femoral Cravat (Fig. 155).—Tie a cravat around the thigh a short distance above the patella. Place the body of a long cravat on the dorsum of the foot, and carry its extremities under the sole and up along the sides of the heel, to be fastened to the cravat around the thigh (Fig. 155).

It may be used in injuries of the back of the leg, either to keep the leg flexed on the thigh or the foot extended on the leg.

The Tarso-patellar Cravat (Fig. 156).—Place the body of a cravat on the front of the thigh, just above the patella. Carry its extremities around, crossing in the popliteal space, fastening them just below the patella. Place the body of a second cravat on the sole of the foot, and make a single knot on the instep; then carry the extremities upward on each side of the leg, and fasten them to the cravat around the lower part of the thigh, as seen in figure 156.

It is intended as a temporary dressing in fracture of the patella.

The Triangular Cap of the Knee (Fig. 157).—Place the base of the triangle below the patella, carrying its extremities around the popliteal space, and fasten them above the patella. Bring the apex up over the front of the joint, pass it beneath the part around the thigh, and turn it down, fastening it with a pin (Fig 157).

This may be used instead of the roller bandage to retain applications to the knee.

The Tibial Triangle (Fig. 157).—Place the base of the triangle obliquely across the leg, the apex being downward. Carry the upper extremity around and pin it to the body of the triangle near its base. Bring the lower extremity around

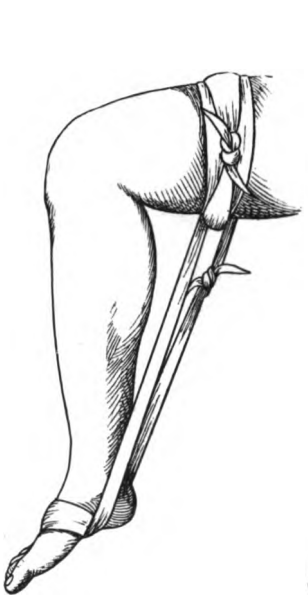


FIG. 155.—TARSO-FEMORAL CRAVAT.

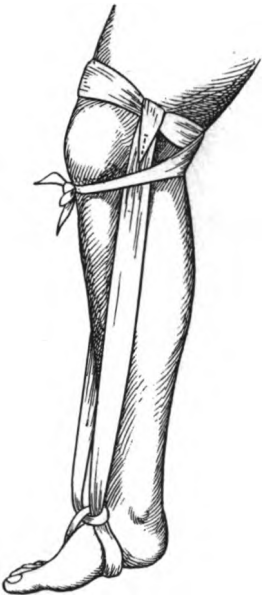


FIG. 156.—TARSO-PATELLAR CRAVAT.

FIG. 157.

and fasten it lower down near the apex of the triangle. Then turn the apex up and pin it as seen in figure 157.

The Tibial Cravat (Fig. 157).—Place the body of the cravat on the leg, transverse to its long axis. Carry the extremities around the limb, tying them in front, as seen in figure 157.

The Tarso-malleolar Cravat (Fig. 157).—Place the body of the cravat on the sole of the foot and carry its extremities

over the instep and fasten them around the ankles, as seen in figure 157.

The Malleolo-phalangeal Triangle (Fig. 158).—Place the base of a triangle on the back of the leg above the heel and bring its apex up over the toes to the front of the ankle-joint. Carry the two extremities down over the instep, around under the sole of the foot, and back again to the instep, where they are to be tied, as seen in figure 158. The apex is then to be turned down and fastened by the extremities or

FIG. 158.—MALLEOLO-PHALANGEAL TRIANGLE.

FIG. 159.—TRIANGULAR CAP OF THE HEEL.

pinned. Instead of fastening the extremities around the foot as just described, they may, if so preferred, be tied around the ankle.

This is a good bandage to retain applications to the foot, or to use as a cover to a dressing underneath to prevent its getting soiled.

The Triangular Cap of the Heel (Fig. 159).—Place the base of the triangle on the sole of the foot, beneath the instep, and carry its apex up the back of the leg. Bring the two extremities up over the instep and fasten them around the ankle, as seen in figure 159. The apex should be turned down, and either pinned or held in place by the extremities, as shown in the illustration.

The Triangular Cap for Stumps (Fig. 160).—Place the base of the triangle near the end of the stump, and bring its apex up on the opposite side. Carry the two extremities around the part, over the apex, and fasten them either by pinning or tying. The apex should be turned down and pinned or included in the knot, as shown in figure 160.

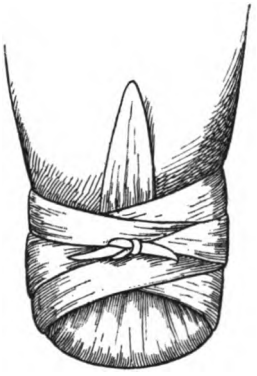


FIG. 160.—TRIANGULAR CAP FOR STUMPS.

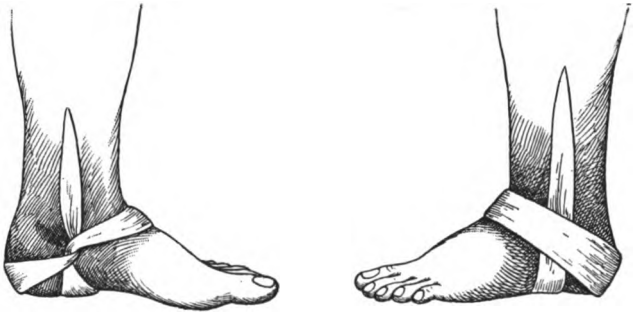


FIG. 161. FIG. 162.

FIGS. 161 AND 162.—BARTON'S EXTENSION CRAVAT.

Barton's Extension Cravat (Figs. 161 and 162).—Fold a handkerchief into the form of a cravat, and double it so as to make one end twice as long as the other. Place the body of the cravat directly over the point of the heel, beneath the insertion of the tendo Achillis, bringing the long end forward

under the outer ankle and the short end forward under the inner ankle. Carry the long end over the instep and pass it around the short end from above downward, as seen in figure 161, then continue it beneath the sole of the foot and up under the bandage on the opposite side, as shown in figure 162. It will now be seen that each end comes up the leg from *beneath* the transverse portion of the bandage, and not from its outer side. The two ends are then turned down and knotted beneath the foot, the knot formed by the band-

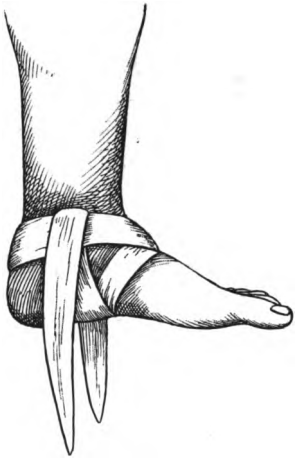


FIG. 163.—GERDY'S EXTENSION CRAVAT.

age on the inner border of the foot being adjusted so as to lie in the hollow of the sole.

Gerdy's Extension Cravat (Fig. 163).—Place the body of the cravat on the tendo Achillis, and bring the two extremities forward, crossing them over the instep. Continue them down under the sole of the foot and up on each side, passing them beneath the turn around the ankles. They are then to be brought down and tied beneath the foot. (See Fig. 163.)